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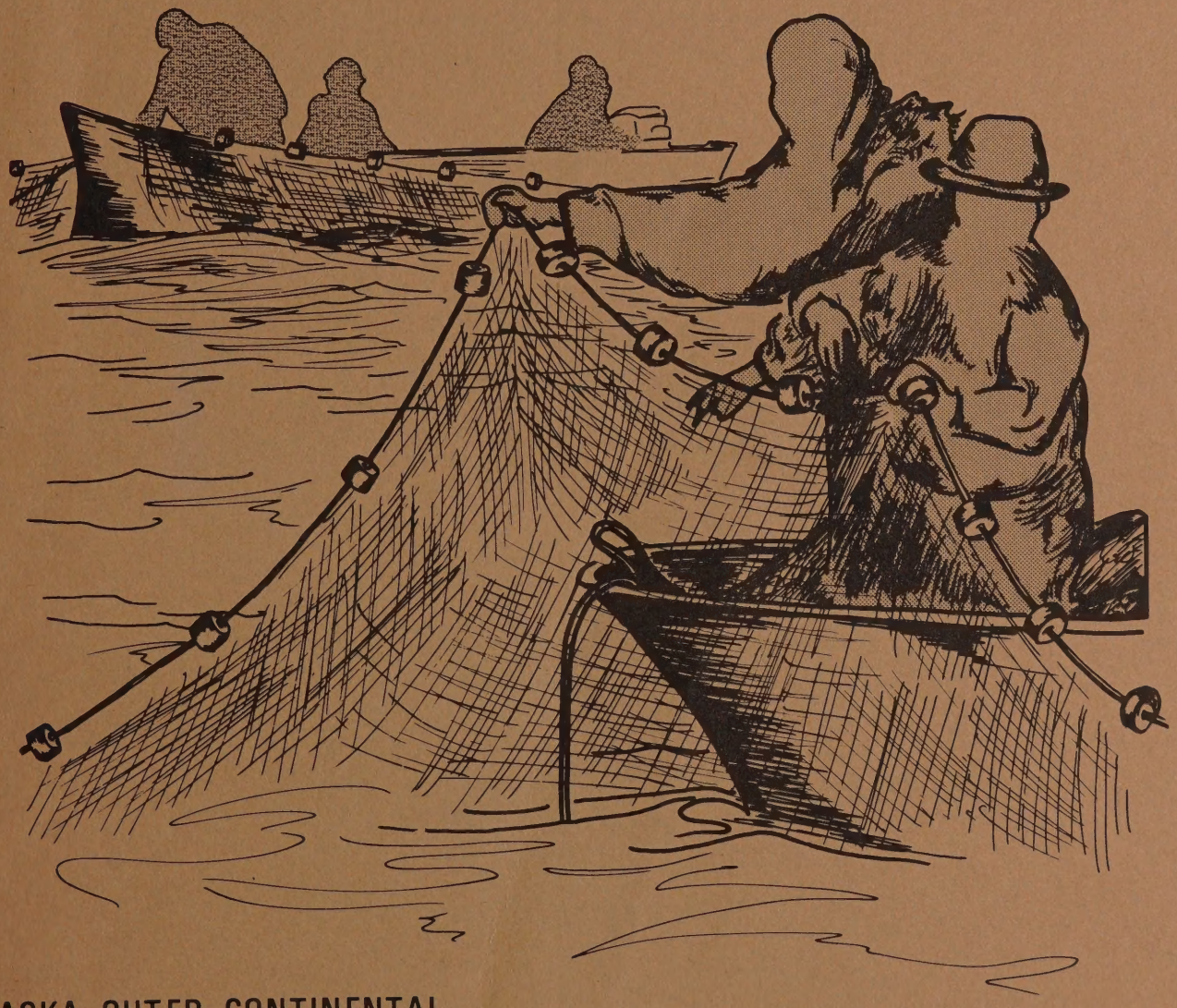

ALASKA OUTER CONTINENTAL
SHELF OFFICE
OIL & GAS LEASE SALE

VOLUME
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UNITED STATES
DEPARTMENT OF THE INTERIOR

FINAL
ENVIRONMENTAL IMPACT STATEMENT
March 1980

Proposed
Outer Continental Shelf
Oil and Gas Lease Sale
Eastern Gulf of Alaska

Prepared by
BUREAU OF LAND MANAGEMENT

Director, Bureau of Land Management

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FINAL ENVIRONMENTAL IMPACT STATEMENT

Proposed Outer Continental Shelf
Oil and Gas Lease Sale
Eastern Gulf of Alaska

Summary Sheet

( ) Draft (X) Final

U.S. Department of the Interior, Bureau of Land Management, Alaska OCS Office, P.O. Box 1159, Anchorage, Alaska 99510.

1. Type of Action: Proposed Oil and Gas Lease Sale, Eastern Gulf of Alaska.

(X) Administrative ( ) Legislative

2. Description of the Action: Three hundred and fifty blocks (792,085 hectares, 1,952,242 acres) of OCS lands are proposed for leasing action. The tracts extend from south and east of Yakutat along the territorial boundary and generally seaward from the coast to the 300 meter isobath. If implemented, this sale is tentatively scheduled to be held in October 1980.

3. Environmental Impacts: All blocks offered pose some degree of pollution risk to the environment. The risk potential is related to adverse effects on the environment and other resource uses which may result principally from accidental or chronic oilspills. Socioeconomic effects from onshore development will have predominantly local and some State and regional implications.

Several alternatives and mitigating measures may be applied which will reduce the type, occurrence, and extent of adverse impacts associated with this proposal. Other measures, which are beyond the capability of this agency to apply, have been identified. In spite of mitigating measures, some impacts are considered unavoidable. For instance, oilspills are considered statistically probable, some disturbance to fishery and wildlife values will occur, and some onshore development will occur in undeveloped areas. For each significant ecological resource, the probability of an oilspill impacting them has been given, based on an oilspill risk model.

4. Alternatives:
   a. No sale.
   b. Delay the sale.
   c. Modify the sale by deletion of the nearshore area.
   d. Modify the sale by deletion of the nearshore and northwest portions.

5. Scoping Comments have been requested from the following:

Federal Agencies
Department of Agriculture
U.S. Forest Service

Department of Commerce
- National Marine Fisheries Service
- National Oceanic and Atmospheric Administration
- Office of Coastal Zone Management
- Office of Ecological and Environmental Conservation

Department of Defense
- Army Corps of Engineers
- Department of the Army
- Naval Operations
- U.S. Air Force

Department of Energy
Department of the Interior
- Bureau of Indian Affairs
- Bureau of Mines
- Bureau of Land Management, State Director
- Fish and Wildlife Service
- Geological Survey
- Heritage Conservation and Recreation Service
- National Park Service

Department of the Treasury
Department of Transportation
Environmental Protection Agency

Joint Federal-State Land Use Planning Commission

State of Alaska
The Honorable Jay S. Hammond, Governor
State-Federal Coordinator, Division of Policy Development and Planning
Department of Administration
Department of Commerce and Economic Development
Department of Community and Regional Affairs
Department of Environmental Conservation
Department of Fish and Game
Department of Health and Social Services
Department of Highways
Department of Labor
Department of Law
Department of Natural Resources
Department of Public Works
Department of Revenue

Local Government
Cordova, Alaska
- Honorable Jim Poor, Mayor
- Perry Lovett, City Manager

Seward, Alaska
- Honorable Richard A. Neve, Mayor

Yakutat, Alaska
- Honorable Larry Powell, Mayor
- Fred Kent, Superintendent of Schools
- Cornelia Howard, Yakutat Health Center

Native Corporations
Chugach Natives, Inc.
Eyak Corporation
Eyak Village Council
North Pacific Rim Native Association
Sealaska Corporation
Yak-tat-Kwaan, Inc.

Oil and Gas Industry
Alaska Oil and Gas
Amoco Production Company
Atlantic Richfield
Chevron USA, Inc.
Cities Service Company
Exxon Corporation
General Crude Oil Company
Marathon Oil Company
Placid Oil Company
Shell Oil Company
Texaco, Inc.
Union Oil of California

Special Interest Groups
Alaska Center for the Environment
Alaska Conservation Society
Alaska League of Women Voters
Alaska Public Interest Res. Group
Alaska Wildlife Federation and Sportman's Council, Inc.
Arctic Institute of North America
Audubon Society, Anchorage Chapter
Bertha's Brokerage
Cordova Aquatic Marketing Association
Cordova District Fisheries Union
Environmental Center, West Anchorage High School
Friends of the Earth
Greenpeace Alaska
Izaak Walton League of America
Prince William Sound Aquaculture Corporation
Seward Fisheries
Sierra Club
The Trumpeter Swan Society
Trustees for Alaska
Wilderness Society

6. Final environmental statement made available to the Environmental Protection Agency and the public on March 31, 1980.

7. Contacts

For further information regarding this final environmental impact statement contact:

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Washington, D.C. 20240
202-343-6264

TABLE OF CONTENTS

	Page
SUMMARY OF ENVIRONMENTAL IMPACT STATEMENT FOR PROPOSED SALE 55	viii
PURPOSE AND NEED FOR ACTION	1
A. Leasing Process	1
B. Leasing History	2
C. Legal Mandates and Authority	3
1. OCS Lands Act	3
2. Federal/State Coordination	7
3. Establishment of Compensatory Funds	8
4. Environmental Studies Program	9
5. The National Outer Continental Shelf (OCS) Advisory Board and the Intergovernmental Planning Program	9
D. Federal Regulatory Responsibilities	11
E. Relationship of the Proposed Sale to the Overall OCS Leasing Program	16
F. Lease Stipulations	16
1. History of Mitigating Measures	16
2. Committed Mitigating Measures	17
a. OCS Operating Orders	17
b. 30 CFR Part 250 Federal Regulations	18
c. Stipulation for protection of Cultural Resources	18
d. Stipulation for Orientation Program	18
e. Stipulation for pipelines	19
f. Stipulation for wells and pipelines	19
3. Other Mitigating Measures	20
4. Effectiveness of Mitigating Measures	21
I. Alternatives Including Proposed Action	22
A. Resource Estimate and Production Assumptions	24
B. Analysis of the Proposal and Its Alternatives	24
1. Alternative I - Proposed Action	24
a. Description of the Proposal	24
b. Basic Development Assumptions	24
Estimated Activity Resulting from the Proposed Action	24
Estimated Activity Based on Mean Scenario	25
Possible Offshore Loading Scenario	26
c. Summary of Probable Impacts	26
2. Alternative II - No Sale	31
a. Description of Alternative	31
b. Energy Requirements and Conservation Potential	31
c. Summary of Probable Impacts	49

3. Alternative III - Delay the Sale..... 49
4. Alternative IV - Modify the Sale By Deletion of the Nearshore Area..... 52
5. Alternative V - Modify the Sale By Deletion of the Nearshore and Northwest Portion..... 56
6. Alternative VI - Modify the Sale By Deletion of Five Tracts Near Fairweather Gounds..... 59a
7. Alternative VII - Modify the Sale By Deletion of Three Tracts for Protection of Fisheries and Spawning Areas. 59a
8. Other Potential Tract Deletion Options..... 59b

C. Discussion of Comparative Analysis of Impacts and Alternatives..... 60

II. Description of the Affected Environment..... 62

A. Description of the Affected Environmental Conditions on Offshore Oil and Gas Operations..... 62
1. Environmental Geology (Graphic No. 1)
a. Physiography
b. Yakutat Shelf Geology
c. Earthquakes and Associated Hazards
2. Meteorological Conditions and Physical Oceanography (Graphic No. 2)
a. Meteorological Conditions
b. Physical Oceanography

B. Description of the Biological Characteristics of the Affected Environment..... 62
1. Marine Habitats and Food Web Resources (Graphic No. 3)
a. Pelagic Habitat
b. Benthic Habitat
c. Littoral and Nearshore Habitats
2. Commercial and Sport Fish
a. Major Fin and Shellfish Distributions (Graphic No. 4)
b. Commercial Fisheries (Graphic No. 5)
3. Marine and Coastal Birds (Graphic No. 6)
a. Offshore Waters
b. Inshore Waters
c. Tidal Zone
d. Land and Inland Waters
4. Marine Mammals (Graphic No. 7)
5. Terrestrial Mammals
6. Endangered and Threatened Species (Graphic No. 8)

C. Description of Social and Economic Components of the Affected Environment..... 64
1. Lifestyle of Yakutat..... 64
2. Local Economy of Yakutat..... 68
a. Employment..... 68
b. Commercial Fishing Industry..... 71

c. Oil Exploration..... 76
d. Wood Products..... 76
e. Tourism and Recreation..... 77
f. Military..... 78
g. Yakutat City Finance..... 78
3. Cultural Resources (Graphic No. 9)
4. Visual Resources..... 79
5. Recreation and Tourism..... 81
6. Wilderness Resources..... 83
7. Land Status and Land Use (Graphic No. 10)
8. Transportation Systems..... 83

D. Coastal Zone Management..... 84
1. State Coastal Management Programs..... 84
2. Section 307(e) Consistency Review..... 84
3. Yakutat District Coastal Management Program..... 84

E. Water Quality..... 86

F. Air Quality..... 87

G. BLM Studies Programs..... 89
1. Environmental Studies Program..... 89
2. Objectives of the Alaska OCS Environmental Assessment Program..... 89
3. Socioeconomic Studies Program..... 95

III. Environmental Consequences..... 98

A. Basic Assumptions Used in Analysis..... 98
1. Basic Assumptions Regarding Causes of Possible Impact Resulting from the Alternatives Including the Proposal..... 98
a. Exploratory Activities..... 98
b. Development Activities..... 101
c. Production Activities..... 103
d. Sale 55, Gulf of Alaska Oilspill Analysis..... 104
e. Constraints on Oil and Gas Development..... 110
2. Alternative I - Proposed Action..... 113
a. Impacts on the Biological Characteristics of the Affected Environment..... 114
Impacts on Marine Habitats and Food Web Resources..... 114
Impacts on Fish Resources..... 119
Impacts on Commercial Fishing..... 121
Impacts on Birds..... 125
Impacts on Marine Mammals..... 130
Impacts on Terrestrial Mammals..... 134
Impacts on Endangered and Threatened Species.... 135
b. Impacts on the Affected Social and Economic Environment..... 142
Impacts on the Lifestyle of Yakutat..... 142
Impacts on the Local Economy of Yakutat..... 148

Impacts on Cultural Resources..... 160
Impacts on Visual Resources..... 163
Impacts on Recreation and Tourism..... 164
Impacts on Wilderness Resources..... 165
Impacts on Land Use..... 166
Impacts on Transportation..... 167
c. Impacts on Coastal Zone Management..... 168
d. Impacts on Water Quality..... 169
e. Impacts on Air Quality..... 170
f. Impacts of the Offshore Loading Scenario..... 172
Impacts of Significant Concern..... 172
Impacts on the Lifestyle of Yakutat..... 172
Impacts on the Local Economy of Yakutat..... 172
Impacts on Water Quality..... 173
Impacts on Air Quality..... 174
Impacts on Commercial Fishing..... 174
Impacts on Endangered and Threatened Species.... 175
Impacts of Secondary Concern..... 176
Impacts on Marine Habitats and Food Web Resources..... 176
Impacts on Fish Resources..... 176
Impacts on Birds..... 177
Impacts on Marine Mammals..... 177
3. Alternative II - No Sale..... 178
a. Impacts on the Biological Characteristics of the Affected Environment..... 178
Impacts on Marine Habitats and Food Web Resources..... 178
Impacts on Fish Resources..... 178
Impacts on Commercial Fishing..... 178
Impacts on Birds..... 178
Impacts on Marine Mammals..... 178
Impacts on Terrestrial Mammals..... 178
Impacts on Endangered and Threatened Species.... 178
b. Impacts on the Affected Social and Economic Environment..... 178
Impacts on the Lifestyle of Yakutat..... 178
Impacts on the Local Economy of Yakutat..... 179
Impacts on Cultural Resources..... 185
Impacts on Visual Resources..... 185
Impacts on Recreation and Tourism..... 185
Impacts on Wilderness Resources..... 186
Impacts on Land Use..... 186
c. Impacts on Coastal Zone Management..... 186
d. Impacts on Water Quality..... 186
e. Impacts on Air Quality..... 187
4. Alternative III - Delay the Sale..... 188
a. Impacts on the Biological Characteristcs of the Affected Environment..... 188
Impacts on Marine Habitats and Food Web Resources..... 188
Impacts on Fish Resources..... 188
Impacts on Commercial Fishing..... 189

Impacts on Birds..... 189
Impacts on Marine Mammals..... 189
Impacts on Terrestrial Mammals..... 190
Impacts on Endangered and Threatened Species.... 190
b. Impacts on the Affected Social and Economic Environment..... 190
Impacts on the Lifestyle of Yakutat..... 190
Impacts on the Local Economy of Yakutat..... 191
Impacts on Cultural Resources..... 191
Impacts on Visual Resources..... 192
Impacts on Recreation and Tourism..... 192
Impacts on Wilderness Resources..... 192
Impacts on Land Use..... 193
c. Impacts on Coastal Zone Management..... 193
d. Impacts on Water Quality..... 194
e. Impacts on Air Quality..... 194
5. Alternative IV - Modify the Sale By Deletion of the Nearshore Area..... 196
a. Impacts on the Biological Characteristics of the Affected Environment..... 196
Impacts on Marine Habitats and Food Web Resources..... 196
Impacts on Fish Resources..... 197
Impacts on Commercial Fishing..... 198
Impacts on Birds..... 198
Impacts on Marine Mammals..... 199
Impacts on Terrestrial Mammals..... 199
Impacts on Endangered and Threatened Species.... 199
b. Impacts on the Affected Social and Economic Environment..... 200
Impacts on the Lifestyle of Yakutat..... 200
Impacts on the Local Economy of Yakutat..... 200
Impacts on Cultural Resources..... 201
Impacts on Visual Resources..... 203
Impacts on Recreation and Tourism..... 203
Impacts on Wilderness Resources..... 204
Impacts on Land Use..... 204
c. Impacts on Coastal Zone Management..... 204
d. Impacts on Water Quality..... 205
e. Impacts on Air Quality..... 206
6. Alternative V - Modify the Sale By Deletion of the Nearshore and Northwest Portions..... 207
a. Impacts on the Biological Characteristics of the Affected Environment..... 207
Impacts on Marine Habitats and Food Web Resources..... 207
Impacts on Fish Resources..... 208
Impacts on Commercial Fishing..... 208
Impacts on Birds..... 208
Impacts on Marine Mammals..... 209
Impacts on Terrestrial Mammals..... 209
Impacts on Endangered and Threatened Species.... 209
b. Impacts on the Affected Social and Economic Environment..... 210

Impacts on the Lifestyle of Yakutat..... 210
Impacts on the Local Economy of Yakutat..... 211
Impacts on Cultural Resources..... 211
Impacts on Visual Resources..... 213
Impacts on Recreation and Tourism..... 213
Impacts on Wilderness Resources..... 214
Impacts on Land Use..... 214
c. Impacts on Coastal Zone Management..... 214
d. Impacts on Water Quality..... 215
e. Impacts on Air Quality..... 215

B. Relationships between Short-Term Use and Maintenance and Enhancement of Long-Term Productivity..... 217

C. Irreversible and Irretrievable Commitment of Resources.... 219
1. Mineral Resources..... 219
2. Biological Resources..... 219
3. Endangered and Threatened Species..... 219
4. Lifestyle of Yakutat..... 220

D. Impact of the Maximum Development Scenario..... 221
1. Impacts on the Biological Characteristics of the Affected Environment..... 221
a. Sale 55, Gulf of Alaska Oilspill Analysis..... 221
b. Impacts on Fisheries, Marine Mammals, and Birds..... 221
c. Impacts on Coastal Ecology..... 221
2. Impacts on the Affected Social and Economic Environment..... 222
a. Impacts on the Lifestyle of Yakutat..... 222
b. Impact on Local Economy of Yakutat..... 225

IV. List of Preparers..... 230

Contributing Authors and Supporting Staff Members..... 230

V. Consultation and Coordination..... 231

A. Results of the Scoping Process for Proposed OCS Sale No. 55..... 231

B. List of Contacts for Preparation of the Draft Environmental Impact Statement..... 234

C. Coordination and Review of the Draft Environmental Impact Statement Leading to Preparation of the Final Environmental Statement..... 238

Literature Cited

List of Appendices

A. Petroleum Development Scenarios and Basic Assumptions Utilized to Develop the Alternatives Including the Proposal

B. USGS Analysis of Gulf of Alaska OCS Operating Orders

C. Tract List

D. State and Regional Economies and Their Impacts

E. Estimation of Direct Employment and Description of Basic Assumptions Utilized

F. Weights and Measures

G. Comments from Scoping

Index and Acronym Glossary

Summary of Environmental Impact Statement for Proposed Sale 55

The following statement discusses a proposal for oil and gas leasing in the eastern Gulf of Alaska, alternatives to the proposal which include a no-action alternative, and the impacts of each of those environmental issues determined by scoping process and environmental assessment to be significant. The scoping and environmental assessment process indicated the significant issues to be: maintenance of Yakutat's community and subsistence lifestyle, local economy, commercial fishing, endangered species (including whales), cultural resources, water quality, and air quality.

The proposal consists of offering for lease 350 blocks (approximately 1,952,242 acres) in water depths from 30 - 400 m, and from 6 - 93 km from shore in the eastern Gulf of Alaska. The geological Survey estimated that the proposed lease area has a 1-in-20 or 5 percent probability of containing undiscovered, recoverable resources ranging from 250 - 800 million barrels of oil, and 0.7 - 2.25 trillion cubic feet of gas. The USGS has also determined that a 95 percent probability exists of no commercial oil or gas reserves being found.

Proposed development activities over the 37 years of the project's expected productive life include a support and supply base being initiated at Yakutat in 1984, and 2 bottom-founded production platforms with a total of 70 wells being drilled between 1987 and 1991. From 1986 through 1988, a total of 80 km of 20 inch offshore oil pipeline is proposed for construction, with an oil terminal to be constructed in 1988 adjacent to Monti Bay at Yakutat. In the event gas should be discovered in sufficient commercial quantities, the construction of a liquefied natural gas (LNG) plant and terminal adjacent to Monti Bay, and a regasification plant located in the lower 48, is proposed for the period 1986 through 1988.

The following alternatives to the proposal (Alternative I) were identified in response to and in an attempt to mitigate the significant scoping and environmental issues: Alternative II - no-sale action; Alternative III - delay the sale; Alternative IV - reduction of proposed lease area to 289 blocks (1,649,978 acres) Alternative V - reduction of the proposed lease area to 218 blocks (1,245,762 acres). Alternative VI - deletion of 5 tracts near Fairweather Grounds, and Alternative VII - Deletion of three tracts to protect fisheries and spawning areas.

The severity of socioeconomic impacts on Yakutat depend to a considerable degree on whether or not onshore facilities development is confined to an industrial enclave or compound. If onshore development is not separated from the community of Yakutat, then socioeconomic impacts to the maintenance of Yakutat's lifestyle could be quite severe.

Regarding offshore impacts on biological waters, USGS oilspill risk analysis suggests that there is a 31 percent chance of an offshore oilspill reaching the shoreline in 3 days under Alternative 1. Alternatives IV and V, which offshore nearshore tract deletions, reduce the probability of an offshore oilspill impacting the shoreline. Alternatives V, VI, and VII which contains additional offshore tract deletions reduces the risk of impact to the offshore commercial fisheries.

PURPOSE AND NEED FOR ACTION

The Federal Government is required by law to manage the exploration and development of oil and gas resources on the Outer Continental Shelf (OCS). To help meet the energy needs of the nation in an environmentally safe manner, these resources must be developed as rapidly and yet as carefully as possible. While overseeing this development, the Federal Government must balance orderly resource development with protection of the human, marine, and coastal environments, ensure that the public receive a fair return for these resources, and preserve and maintain free enterprise competition.

In view of the growing imbalance between domestic oil and gas production and use, especially the expected decline in production from prime areas such as the Gulf of Mexico and the North Slope, there is a greater need to develop resources from the OCS frontier areas.

The following figure shows the continuing decline in crude oil production in the contiguous United States, the growing importance of Alaskan oil, and the dramatic rise in petroleum imports.

- By 1985, petroleum imports are projected to be 80 percent higher than in 1975. (The administration's latest energy program proposals, based in large part on conservation and increased domestic energy production would reduce our dependence on foreign oil by 4.5 million barrels per day by 1990, according to the President's message on the environment of August 2, 1979.)

- Through 1990, the shift in the pattern of supply is projected to continue; 36 percent of petroleum liquids production in 1990 would come from Alaska or from the U.S. Outer Continental Shelf. In 1977, offshore areas and Alaska accounted for only 19 percent of domestic production (Energy Information Administration, 1978).

In contrast to development in other oil importing countries, the volume of U.S. oil imports rose more because domestic production was lower, not because domestic use was higher. Between 1973 and 1977, U.S. oil production declined by 1.2 million barrels per day, while use increased by 1.0 million barrels per day. In addition, the higher price of oil has been the most important factor underlying the large U.S. trade deficit (letter dated February 15, 1979, from Daniel H. Brill, Assistant Secretary for Economic Policy, Dept. of the Treasury).

Action to expand U.S. energy production, such as implementation of this proposed lease sale, is necessary now if we are to ensure that sufficient energy sources will come on-stream when needed.

A. Leasing Process

The Outer Continental Shelf Lands Act of 1953, as amended, charges the Secretary of the Interior with administering mineral exploration and development of the Outer Continental Shelf (OCS), as well as conserving natural resources of the shelf. The law requires that the Secretary of the Interior make oil and gas resources available to meet the Nation's energy needs as rapidly as possible, and to balance orderly energy resource development with protection of the human, marine, and coastal environments.

The USGS supervises and regulates exploration, development, and production activities after the leases are issued. The leasing process includes the following decisionmaking steps:

1. Sale schedule
2. Call for nominations
3. Tentative tract selection
4. Final tract selection
5. Preparation of environmental statement
6. Public hearings
7. Draft Secretarial Issue Document (SID) and Preliminary Notice of Sale
8. Final SID
9. Decision
10. Notice of Sale
11. Sale/leases issued
12. Exploration plan and drilling permit approvals
13. Transportation management plan approvals
14. Development and production plan evaluation and approval
15. Pipeline permit issuance
16. Lease termination or expiration

The National Environmental Policy Act (NEPA) of 1969 (83 Stat. 852), requires that all Federal agencies review any potential impact on the environment from any major Federal action (sec. 102(2)(c)). This review is in the form of an environmental impact statement (EIS). The EIS is made publicly available for review and comment before a decision is made to hold a lease sale, and the EIS and other documents are used by the Secretary of the Interior throughout the decisionmaking process. The EIS ensures that all environmental factors and concerns are considered by the Government. It also advises the public of the environmental consequences of a proposed action.

A minimum of 45 days after the draft environmental impact statement is published, a public hearing is usually held. Written or oral comments are given equal weight when in preparing the final environmental impact statement.

B. Leasing History

Federal oil and gas leasing first occurred on the Alaska Outer Continental Shelf in 1976. The first Federal OCS lease sale was held April 13, 1976, for the northern Gulf of Alaska (Sale 39). Of the 186 blocks (408,134 hectares, or about 1 million acres) offered, 76 blocks (165,543 hectares, or 409,057 acres) were leased for a total bonus of $559,836,587.

Drilling activity in the northern Gulf of Alaska began in September 1976, and has resulted in 11 dry holes in the Yakataga shelf area. The last of the wells was abandoned in July 1978, and no further drilling plans have been announced. Of the 76 leases issued in the northern Gulf of Alaska, 32 leases have been relinquished. The remaining leases do not expire until May 1981.

At the present time, OCS leases in lower Cook Inlet are in the post-sale exploratory phase. A draft EIS on the lease sale 46 area was printed in April of 1977. A change in the leasing schedule was announced shortly after publication

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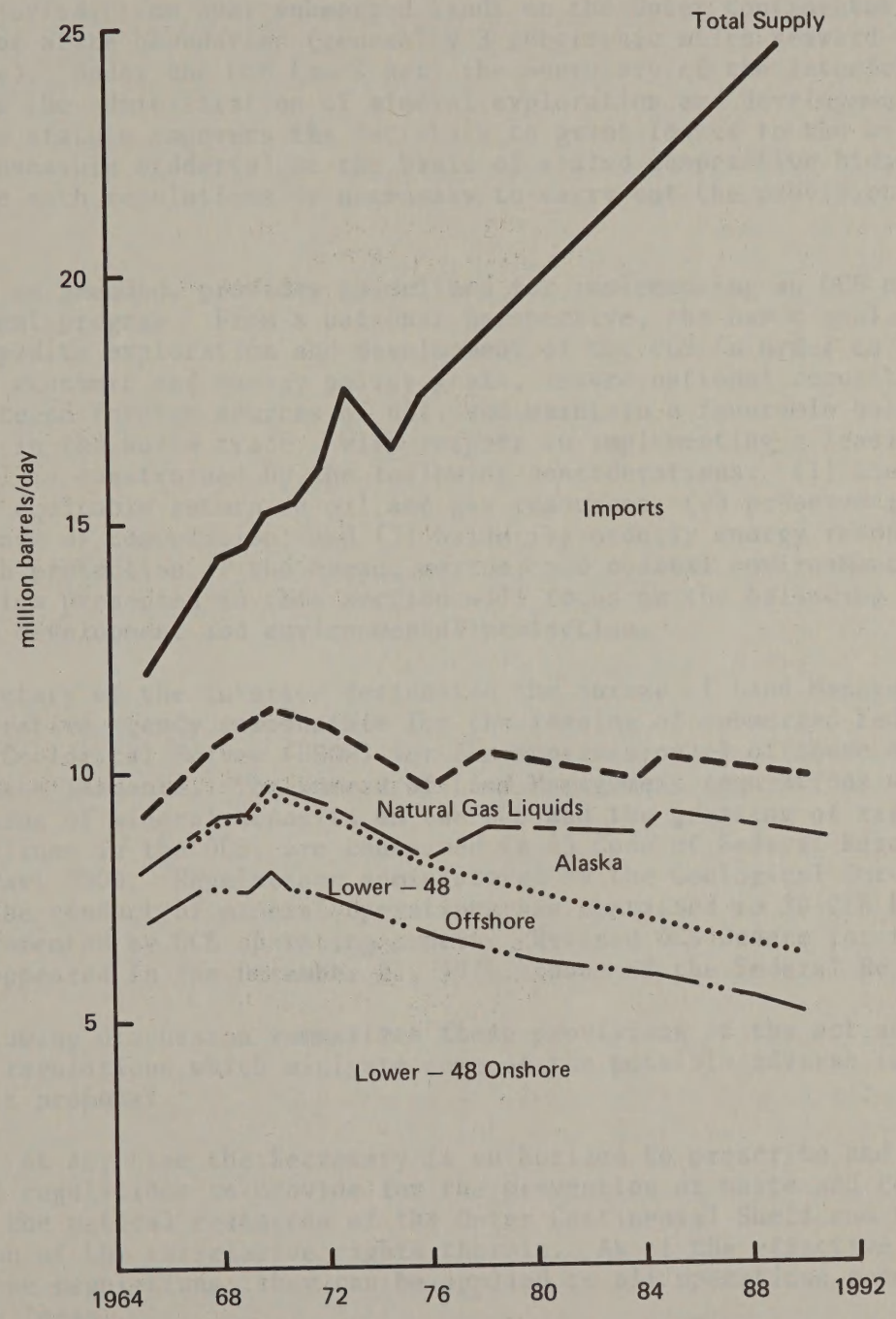

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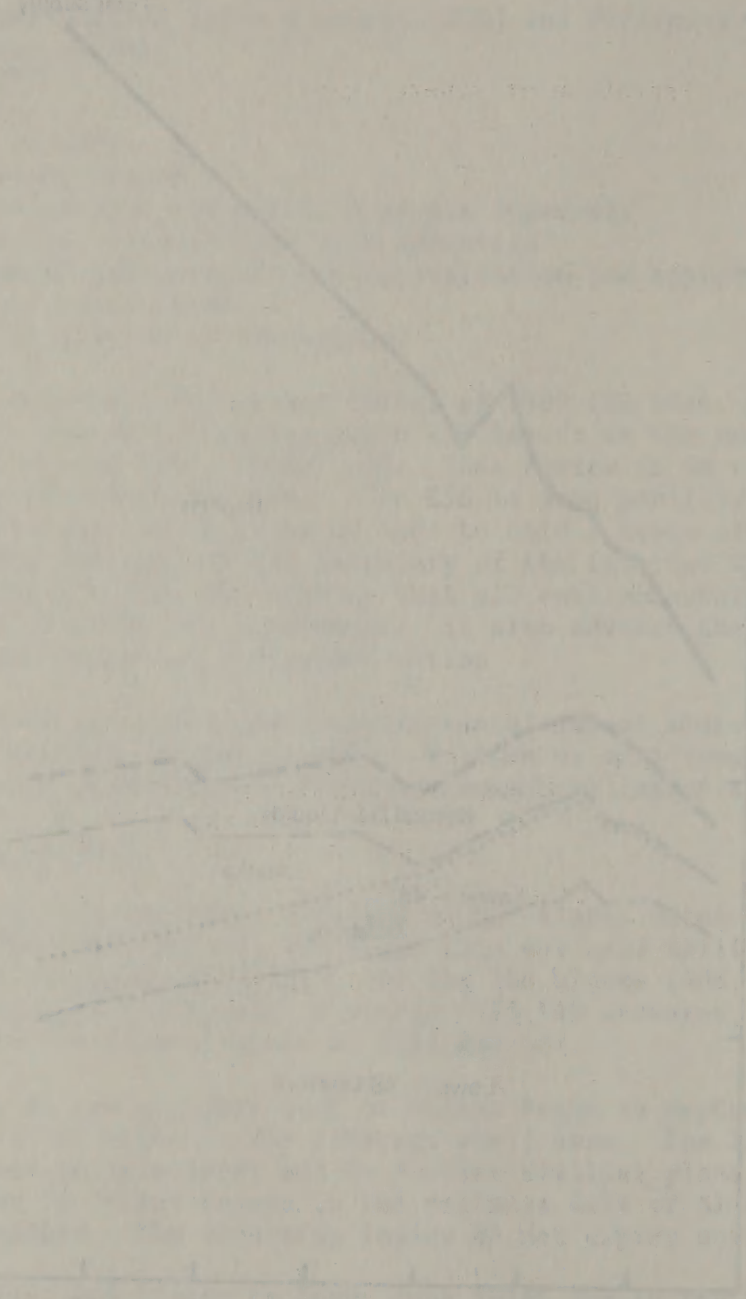


changing the proposed sale date to December 1980. Due to new information and new EIS writing procedures, a second draft EIS has been prepared. A proposed sale in lower Cook Inlet and the northern part of Shelikof Strait is scheduled for September 1981.

C. Legal Mandates and Authority

1. OCS Lands Act: The Outer Continental Shelf Lands Act of 1953 (43 U.S.C. 1331 et seq.) as amended (P. L. 95-372; 92 Stat. 629), established Federal jurisdiction over submerged lands on the Outer Continental Shelf (OCS) seaward of State boundaries (generally 3 geographic miles seaward of the coastline). Under the OCS Lands Act, the Secretary of the Interior is responsible for the administration of mineral exploration and development on the OCS. The statute empowers the Secretary to grant leases to the highest qualified responsible bidder(s) on the basis of sealed competitive bids and to formulate such regulations as necessary to carry out the provisions of the act.

The act, as amended, provides guidelines for implementing an OCS oil and gas development program. From a national perspective, the basic goal of the act is to expedite exploration and development of the OCS in order to achieve national economic and energy policy goals, assure national security, reduce dependence on foreign sources of oil, and maintain a favorable balance of payments in the world trade. With respect to implementing a leasing program, this goal is constrained by the following considerations: (1) the receipt of fair and equitable return on oil and gas resources; (2) preservation and maintenance of competition; and (3) balancing orderly energy resource development with protection of the human, marine, and coastal environments. The information presented in this section will focus on the balancing of orderly resource development and environmental protection.

The Secretary of the Interior designated the Bureau of Land Management as the administrative agency responsible for the leasing of submerged Federal lands, and the Geological Survey (USGS) for the supervision of offshore operations after lease issuance. The Bureau of Land Management regulations which govern the leasing of mineral deposits on the OCS and the granting of rights-of-way for pipelines in the OCS, are contained in 43 Code of Federal Regulations (CFR), Part 3300. Regulations administered by the Geological Survey which govern the conduct of mineral operations are contained in 30 CFR Part 250, and are implemented by OCS operating orders. Revised OCS Orders for the Gulf of Alaska appeared in the December 21, 1979, issue of the Federal Register.

The following discussion summarizes those provisions of the act and its implementing regulations which mitigate some of the possible adverse impacts resulting from this proposal.

1. At any time the Secretary is authorized to prescribe and amend rules and regulations to provide for the prevention of waste and conservation of the natural resources of the Outer Continental Shelf and the protection of the correlative rights therein. As of the effective date of these regulations, they can be applied to all operations conducted under any lease.

2. The Secretary is authorized to suspend or temporarily prohibit an operation or activity pursuant to a lease or permit for environmental reasons.

3. The Secretary is authorized to cancel a lease or permit for environmental reasons.

4. The Secretary is authorized to issue regulations for unitization, pooling, and drilling agreements.

5. The Secretary is authorized to issue regulations for compliance with the national ambient air quality standards pursuant to the Clean Air Act to the extent that OCS authorized activities significantly affect the air quality of any State.

6. The Secretary may cancel a nonproducing lease for the owner's failure to comply with any of the provisions of the act, the lease, or regulations under the act.

7. The Secretary may initiate judicial proceeding to cancel a producing lease because of the owner's failure to comply with any of the provisions of the act, the lease, or regulations under the act.

8. Rights-of-way may be approved under such regulations and upon such conditions as may be prescribed by the Secretary, assuring maximum environmental protection by utilization of the best available and safest technologies.

9. Exploration must be undertaken pursuant to an approved exploration plan. No permit for drilling may be issued until all affected states with approved coastal zone management programs have concurred with the consistency determination provided by the lessee.

10. Geological explorations on unleased areas of the OCS shall be allowed only if such exploration will not be unduly harmful to aquatic life in the area, result in pollution, create hazardous or unsafe conditions, unreasonably interfere with other uses of the area, or disturb any site, structure, or object of historical or archeological significance.

11. Governors of affected States may submit recommendations to the Secretary regarding the size, timing, or location of a proposed lease sale, or with respect to a proposed development and production plan.

12. The Secretary is authorized to enter into cooperative agreements with affected States for several purposes, including but not limited to, sharing of information, joint utilization of available expertise, the facilitating of permit procedures, joint planning and review, and the formation of joint surveillance and monitoring arrangements relevant to OCS operations, both onshore and offshore.

13. The Secretary shall conduct a study of any area or region included in any oil and gas sale in order to establish information needed for assessment and management of environmental impacts on the human, marine,

and coastal environments of the OCS and the coastal areas which may be affected by oil and gas development in such area or region.

14. Subsequent to the leasing and developing of any area or region, the Secretary shall conduct additional studies to establish environmental information and shall monitor the human, marine, and coastal environments of such area or region.

15. The Secretary shall consider relevant environmental information in making decisions, in developing appropriate regulations and lease conditions, and in issuing operating orders.

16. In exercising their respective responsibilities, the Secretary and the Coast Guard shall require, on all new drilling and production operations and, wherever practicable, on existing operations, the use of the best available and safest technologies which the Secretary determines to be economically feasible, wherever failure of equipment would have a significant effect on safety, health, or the environment except where the Secretary determines that the incremental benefits are clearly insufficient to justify the incremental costs of utilizing such technologies.

17. The holder of a lease or permit shall maintain all operations within such lease area or within the area covered by such permit in compliance with regulations intended to protect persons, property, and the environment on the OCS.

18. The Secretary of the Interior and the Secretary of the Department in which the Coast Guard is operating, shall enforce safety and environmental regulations promulgated under the act. The Secretary and the Coast Guard shall promulgate regulations for onsite inspections of OCS facilities.

19. Any person having a valid legal interest which is or may be adversely affected may commence a civil action to compel compliance with the OCS Lands Act against any person, including the United States, for any alleged violation of any provision of the OCS Lands Act, or regulation promulgated thereunder, or terms of any permit or lease issued under the OCS Lands Act.

20. The Attorney General or a U.S. Attorney may institute a civil action for a temporary restraining order, injunction, or other appropriate remedy to enforce any provision of the OCS Lands Act, regulation or order issued under the act or any term of a lease, license, or permit issued under the act. Penalities available include:

a. A civil penalty of not more than $10,000 for each day of noncompliance;

b. A fine of not more than $100,000 or imprisonment for not more than 10 years, for any person who knowingly and willfully (1) violates any provision of the act, any term of a lease, license, or permit issued pursuant to the act, or any regulation or order issued under the authority of the act designed to protect

health, safety, or the environment or conserve natural resources, (2) makes any false statement, representation, or certification in any application, record, report, or other document filed or required to be maintained under this act, (3) falsifies, tampers with, or renders inaccurate any monitoring device or method of record required to be maintained under this act, or (4) reveals any data or information required to be kept confidential by this act.

21. Prior to development and production of an oil and gas lease, the lessee shall submit a development and production plan to the Secretary for approval. The Secretary will determine whether or not the plan is a major Federal action requiring the preparation of an environmental impact statement. At least once, the Secretary shall declare the approval of a development and production plan in any area or region of the OCS, other than the Gulf of Mexico, to be a major Federal action.

22. The Secretary shall disapprove a development and production plan if:

a. the lessee fails to demonstrate he can comply with requirements of the OCS Lands Act or other applicable Federal law;

b. activities described do not receive a consistency concurrence by a State with an approved CZM plan;

c. operations threaten national security or defense; or

d. (1) exceptional geologic conditions, exceptional value in the marine or coastal environment or other exceptional conditions exist, and that implementation of the plan would probably cause serious harm or damage to life, to property, to any mineral deposits, . . . , or to the marine, coastal, or human environments; (2) the threat of harm or damage will not disappear or decrease to an acceptable extent within a reasonable period of time; and (3) the advantages of disapproving a plan outweigh the advantages of development and production.

23. The Secretary shall not grant a license or permit for any activity in such a plan affecting any land or water use in the coastal zone of a State with an approved Coastal Zone Management plan, unless the State concurs or is presumed to concur with the consistency certification accompanying such plan.

24. The Secretary shall, from time to time, review each development and production plan. If the review indicates that the plan should be revised to meet the requirements of section 25 of the OCS Lands Act, the Secretary shall require such revision.

25. The Secretary shall provide affected States with information to assist them in planning for the onshore impacts of possible oil and gas development and production.

26. The Secretary of the Department of Transportation shall administer the Offshore Oil Spill Pollution Fund establishing compensation for injuries caused by oil discharges from an offshore facility or vessel.

27. The Secretary of the Department of Commerce shall administer the Fishermen's Contingency Fund which provides compensation for damage to fishermen's gear or vessels resulting from oil and gas exploration, development, and production.

2. Federal/State Coordination: The OCS Lands Act, as amended, provides a statutory foundation for the Department's policy of coordination of OCS activities with affected States and, to a more limited extent, local governments. At each step of the procedures that lead to lease issuance, participation from affected States and other interested parties is encouraged and sought. Set out below is a detailed discussion of coordination mechanisms required by the OCS Lands Act.

The Secretary of the Interior is required to invite and consider suggestions from the Governors of any affected State during preparation of any proposed leasing program. Each such Governor also receives a copy of the proposed leasing program for review and comment prior to its publication in the Federal Register. The Secretary is required to provide a written response to any request from a Governor for modification of a proposed leasing program. State and local governments may comment directly on a proposed leasing program in its published form. The Secretary is obligated to establish procedures for review of proposed leasing and periodic consultation with State and local governments (Section 18).

Within 60 days after notice of a proposed lease sale or receipt of a development and production plan, the Governor of any affected State may make recommendations to the Secretary with regard to the size, timing, or location of the proposed lease sale or development and production plan. If the Secretary determines that any such recommendations provide for a reasonable balance between the well-being of the citizens of the affected State and the national interest, he must accept them. The Secretary must also respond to the Governor in writing, giving his reasons for accepting, rejecting, or modifying the Governor's recommendations. The Secretary may enter into cooperative agreements with affected States, for purposes consistent with the act and other applicable Federal law (section 19).

When soliciting nominations for the leasing of lands within 3 miles of the seaward boundary of any coastal State, additional information is to be provided to the Governor of those States. The Governor must be informed of the identity of and schedule for the area proposed for leasing; the geographical, geological, and ecological characteristics of the area within 3 miles of the seaward boundary; an estimate of oil and gas reserves in these areas; and any field, trap, or geologic structure in these areas. After the close of the call period, the Governor is informed of any area which merits further consideration for leasing (section 8(g)).

Under section 25 of the act, the Secretary must submit copies of development and production plans to the Governor of any affected State for review. The State then has 60 days to provide comments and recommendations to the Secretary.

Section 11 of the act and the regulations contained in 30 CFR 250.34 also require that any exploration plans submitted to the Secretary must be approved or disapproved within 30 days. Written comments from the Governor of an affected State will be considered prior to approval action if they are timely.

Under section 26 of the act, the Secretary must make available to affected States a summary of data to aid them in anticipating possible onshore effects of OCS development and production. The summary includes estimates of oil and gas reserves in areas leased or to be leased, estimated size and timing of development, pipeline location, and the general location and nature of onshore facilities.

The act also requires preparation and transmittal to each affected State of an index of all relevant actual or proposed programs, plans, reports, environmental impact statements, tract nominations, and other lease sale information. On request, the Secretary must send copies to the affected State.

3. Establishment of Compensatory Funds: Title III of the OCS Lands Act, as amended, establishes in the U.S. Treasury an Offshore Oil Pollution Compensation Fund, to be administered by the Secretary of the Department of Transportation and the Secretary of the Treasury. This fund provides compensation for any person suffering direct or actual injury caused by the discharge of oil from an offshore facility or vessel. A fee of not more than 3¢ per barrel of oil produced on the OCS provides the monies for the fund. The fees collected may be modified or increased to maintain the fund at a level between $100 and $200 million.

Claims for economic loss that arise out of or directly resulting from oil pollution may generally be asserted against the fund by any claimant for removal costs, and by a U.S. claimant who owns or leases property so damaged or who utilizes a natural resource involved, for injury to or destruction of real or personal property, loss of use of real or personal property, and loss of use of natural resources. The President may assert claims for injury to or destruction of natural resources over which the Federal Government exercises sovereign rights or exclusive management authority, as may a State for natural resources owned or managed by the State. Lost profits or impaired earning capacity may be claimed by a United States claimant who derives at least 25 percent of his earnings from activities using property or natural resources affected by oil pollution. Federal, State, and local governments may also assert claims for tax revenue lost due to injury to real or personal property.

Owners and operators of offshore facilities are held strictly liable for all loss attributable to oil pollution from their facilities. Except in cases of gross negligence, willful misconduct, or violation of safety regulations, liability is limited in the case of vessels to the greater of $250,000 or $300 per gross ton; for an offshore facility, liability is limited to the total cleanup and removal costs, and $35 million in damages. Evidence of financial responsibility adequate to satisfy the maximum amount of liability must be provided.

Upon payment of compensation for economic loss compensable under title III, the fund becomes subrogated to all rights, claims, and causes of action of the claimant.

Title IV of the act establishes a Fishermen's Contingency Fund, in an amount not to exceed $1 million. The Secretary of Commerce administers the fund established in the U.S. Treasury. The fund provides for compensation for damage to fishermen's vessels and gear caused by obstructions resulting from oil and gas exploration, development, and production.

The fund establishes area accounts for different areas of the OCS likely to be affected by OCS operations, and provides that lessees, operators, and permittees in the area will pay an amount specified by the Secretary of Commerce, not to exceed $5,000 per lease, permit, easement or right-of-way, and collected by the Secretary of the Interior, to a maximum of $100,000 per area. All of the waters off Alaska are covered by one area account.

The fund may make payments from the appropriate area account to compensate commercial fishermen for actual and consequential damages, including lost profits, due to damage to or loss of fishing gear caused by items associated with oil and gas exploration, development, or production. Claims for damages are presumed valid upon a showing that the commercial fishing vessel was used for fishing and was located in an area affected by OCS operations. A claimant must also establish that no record existed on nautical charts or Notice to Mariners of the item causing damage, and that no marker or lighted buoy spotted the location of the item. A claimant must maintain U.S. citizenship and establish that interests held in the equipment (vessels) are at least 75 percent U.S owned.

As with the Offshore Oil Pollution Contingency Fund, the Fishermen's Contingency Fund becomes subrogated to all rights of any claimant against any person found responsible for damaging the claimant, upon payment of compensation.

Regulations are presently being finalized by the National Marine Fisheries Service for implementing the Fishermen's Contingency Fund.

4. Environmental Studies Program: The OCS Lands Act, as amended, authorizes the Secretary to conduct studies in areas or regions of lease sales to assess and manage the "environmental impacts on the human, marine, and coastal environments of the Outer Continental Shelf and the coastal areas which may be affected by oil and gas development" (43 U.S.C. 1346). Studies in the Kodiak area are described in section III.G. (graphic No. 1).

The act specifies that studies will be conducted in a proposed lease area at least 6 months prior to the conduct of a lease sale. The act also emphasizes studies which develop information necessary for "assessment and management of environmental impacts," and studies designed to predict impacts on the marine biota resulting from chronic low-level pollution or large spills, from the introduction of drill cuttings and muds, and from the laying of pipelines. Subsequent to leasing, the Secretary shall conduct such additional studies as necessary to identify any significant changes in the quality and productivity of such environments, to establish trends in the areas studied and monitored, and to design experiments for identifying the causes of such changes.

5. The National Outer Continental Shelf (OCS) Advisory Board and the Intergovernmental Planning Program: The National OCS Advisory Board has been reorganized into a policy committee, a scientific committee, and six

regional technical working group committees. The policy committee will perform the board's historic function of advising the Secretary of the Interior on OCS policy matters. The scientific committee will make recommendations to the Department concerning the scope and direction of the Bureau of Land Management's Environmental Studies Program.

The technical working groups will participate in a new program that has been established to provide a formal mechanism for regional coordination and planning of three elements of the OCS program administered by the BLM: (1) the leasing process, (2) the Environmental Studies Program, and (3) OCS oil and gas transportation planning. Called the Intergovernmental Planning Program (IPP) for OCS Oil and Gas Leasing, Transportation, and Related Facilities, the program will be initiated in Alaska by the Alaska Regional Technical Working Group. The committee's membership will have the requisite expertise to advise the Director, Bureau of Land Management, on detailed, technical issues throughout the OCS program.

The IPP constitutes a cooperative planning process among Federal and State agencies, private interests, and the petroleum industry. The program is designed to coordinate working group activities with the major steps and decision points in the OCS leasing and development process. To accomplish this, meeting agendas will be developed around four phases, each with specific objectives, beginning prior to the Call for Nominations and Comments for a lease sale, and continuing up to the time development plans are submitted for the sale area. There will be an initial period during which the phases in the program must be modified since the OCS program in each region is now beyond the point of the Call for Nominations for the first sale. The following paragraphs summarize the major issues and the intended results of each phase.

During Phase I, which begins prior to the Call for Nominations, the Alaska Group will: (1) identify regional OCS issues and data needs, (2) make tract selection recommendations, (3) advise the BLM on environmental statement development scenarios and lease stipulations, and (4) preliminarily identify potential pipeline corridors for future study. This phase could last about 2 years and will be completed by the time of a sale decision.

Phase II will be implemented at the time of the sale decision. The Alaska working group will recommend transportation-related studies for inclusion in the BLM's Regional Studies Plan. Other proposed studies may also be identified to be funded and conducted by other Federal or State agencies. These regional studies should be completed prior to completion of Phase II, which could extend over a 2- or 3-year period, and ends with the first commercial discovery in the proposed sale area.

At this point, a sub-State working group will be formed to continue refining potential pipeline corridors that would affect specific areas in Alaska. The State working group would include all Federal and private members in addition to ad hoc members of affected areas. Phase III will begin with the first marketable discovery in the region and will involve the design and implementation of a site-specific studies plan. These studies will be based upon the results of the regional studies and will provide the data needed to develop a Transportation Management Plan.

Phase IV begins with the completion of the site-specific studies and consists of preparation of a Transportation Management Plan (TMP). The TMP will include the identification and analysis of alternative pipeline corridors, the description of onshore areas suitable for the location of pipeline support facilities, an evaluation of surface vessel transportation alternatives, and identification of stipulations or use restrictions for applications to pipeline rights-of-way.

The Bureau of Land Management will use the TMP in developing policies for granting pipeline rights-of-way. The TMP should be completed prior to submission of the first development and production plan for the region in order to provide information to the company preparing the transportation component of the plan and to provide the BLM with a basis for reviewing pipeline rights-of-way applications.

D. Federal Regulatory Responsibilities

Department of the Interior: The Bureau of Land Management (BLM) and the Geological Survey (USGS) are departmental agencies with direct OCS regulatory and enforcement authority. BLM implements the OCS leasing regulations under 43 CFR Part 3300 and cooperates with USGS and other Federal agencies to develop special stipulations that apply to either specific leases or all leases within the proposed lease area. These stipulations may address such matters as cultural and biological resources, pipeline rights-of-way, disposition of drilling wastes, and equipment identification. In addition to issuing leases, BLM issues rights-of-way for common carrier pipelines on the OCS. BLM also issues permits and designates an authorized officer to manage each permit relative to protection of coral in the vicinity of proposed OCS operations.

USGS administers regulations governing mineral operations and development of the OCS under 30 CFR Part 250. The regulations are the basis for OCS operating orders (revised December 21, 1979; Federal Register) which apply to operations in the proposed lease area. See Appendix D for a discussion of USGS proposed draft operating orders for this proposal. Additionally, USGS maintains jurisdiction over producer-owned gathering lines and flowlines on the OCS.

Section 5(a)(8) of the 1978 Amendments to the OCS Lands Act requires the Secretary to promulgate regulations "for compliance with the national ambient air quality standards pursuant to the Clean Air Act (42 U.S.C. 7401 et seq.), to the extent that activities authorized under this Act significantly affect the air quality of any State." In response to this mandate, the Department of the Interior is in the process of promulgating regulations describing a regulatory program. Proposed regulations appeared in 44 F.R. 27449, May 10, 1979.

The U.S. Fish and Wildlife Service (USFWS) shares responsibilities with other agencies for protection of fish and wildlife resources and their habitats, and acts in an advisory capacity in the formulation of OCS leasing stipulations. It also provides recommendations to the Corps of Engineers in the issuance of Federal permits to industry for construction in navigable waters. USF&WS is also responsible for the protection and stewardship of species covered under the Endangered Species Act of 1972.

U.S. Army Corps of Engineers: The OCS Lands Act provides authority to the Secretary of the Army to prevent obstruction to navigation in U.S. navigable waters, and to prevent obstructions caused by structures located on the OCS. Section 10 of the Rivers and Harbor Act of 1899 (30 Stat. 1151) requires that permits be issued for all offshore construction, including pipelines, in U.S. navigable waters.

Permits must also be issued for onshore facilities in which dredging and filling of U.S. navigable waters are involved. Structure permits for exploration drilling vessels and for fixed and mobile platforms are issued by the Corps. Permits for structures in State waters must consider environmental requirements before the issuance pursuant to section 404 of the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977. Section 404 also delegates regulatory authority to the Secretary of the Army for discharge of dredged or fill material in wetlands.

Department of Transportation (DOT): The OCS Lands Act grants authority to the Coast Guard to promulgate and enforce regulations covering lighting and warning devices, safety equipment, and other safety-related matters pertaining to life and property on fixed OCS platforms and drilling vessels. Through the Coast Guard, the Department of Transportation advises the Corps of Engineers on the issuance of permits and the placement of offshore structures. Under the Port and Tanker Safety Act of 1978, the Coast Guard has the authority to establish shipping safety fairway and other ship routing systems in which OCS structures may be prohibited. The Coast Guard also has jurisdiction to enforce the Clean Water Act of 1977 on the OCS.

Under the Federal Water Pollution Control Act, the U.S. Coast Guard approves the procedures to be followed and the equipment used for the transfer of oil from vessel to vessel and between onshore and offshore facilities and vessels. The Coast Guard also conducts pollution surveillance patrols to detect oil discharges within territorial and contiguous waters and has enforcement authority over violations. The Coast Guard also has strike team responsibilities should an oilspill occur.

The Materials Transportation Bureau is responsible for establishing and enforcing design, construction, operation, and maintenance regulations for pipelines. The Department of Transportation's responsibility and authority is further defined in a Memorandum of Understanding between it and the Department of the Interior.

Department of Commerce: The Department of Commerce, through the National Oceanic and Atmospheric Administration (NOAA), is responsible for protection of marine fishery resources and their habitats, and for providing recommendations to the Corps of Engineers as the entity which issues permits in navigable waters.

The Department's responsibility and authorities related to OCS development include the Fishery Conservation and Management Act of 1976, the Marine Mammal Protection Act of 1972, the Endangered Species Act of 1973, the Fur Seal Act of 1966, title II of the Marine Protection, Research, and Sanctuaries Act of 1972 ("Comprehensive Research on Ocean Dumping"), and the National Ocean Pollution Research and Development and Monitoring Act of 1978.

Coastal Zone Management Act: The Coastal Zone Management Act of 1972, as amended (16 USC 1451-1464) (CZMA) is administered by the National Oceanic and Atmospheric Administration of the Department of Commerce. The CZMA establishes a procedure for each coastal State to develop a management program for the protection and management of State coastal resources. The act provides Federal grants for both development and implementation of these programs; in order to be implemented each program must be approved by the Secretary of Commerce. The act also creates a grants and loans program for participating States that must deal with the coastal zone impacts of OCS oil and gas leasing and other energy development.

Section 307 of the CZMA contains the Federal consistency provisions which impose certain requirements on Federal agencies to comply with approved State coastal zone management programs.

Section 307(c)(1) requires Federal agencies conducting or supporting activities directly affecting the coastal zone to be consistent to the maximum extent practical with a State's coastal program. This requirement applies to pre-lease activities which lead up to the actual lease sale. Pursuant to NOAA's Federal consistency regulations (15 CFR Part 930), prior to a lease sale the Department must either notify the State that no consistency determination is required (make a "negative determination") or prepare a consistency determination and submit it to the State.

Section 307(c)(3)(A) prohibits Federal agencies from issuing a license or permit for any activity that affects a land use or water use in the State's coastal zone until a State with an approved coastal zone management program has agreed that the activity subject to the license or permit is consistent with the approved program or the Secretary of Commerce has overriden the State's objections to the activity.

Section 307(c)(3)(B) of the CZMA consistency provisions is very important to OCS resource development. This provision requires that no Federal license or permit for an activity described in an OCS exploration plan or development and production plan which affects a land use or water use in the coastal zone may be approved until a State with an approved coastal zone management plan has concurred in the consistency determination made by the lessee or the Secretary of Commerce has overridden the State's objections.

Finally, under Section 307(d), Federal agencies may not provide Federal assistance for proposed projects that are inconsistent with a State's coastal management program except upon certain fundings by the Secretary of Commerce.

These provisions will have important implications for any exploration, development, and production of OCS oil and gas resources and associated onshore development.

Under the Marine Protection, Research, and Sanctuary Act of 1972, (16 U.S.C. 1431-1434), the Secretary of Commerce is empowered to designate areas as marine sanctuaries "as necessary for the purpose of preserving or restoring such areas for their conservation, recreation, ecological, or esthetic values," following consultation with the Secretaries of State, Defense, Interior, and Transportation, with the Administrator of EPA, and with other interested

agencies. Once an area is designated a marine sanctuary, NOAA's Office of Coastal Zone Management is required to issue "necessary and reasonable regulations" for control of activities permitted within the marine sanctuary. Multiple uses (including oil and gas development) could be permitted within a marine sanctuary, providing these uses comply with the regulations governing the sanctuary.

Department of Energy: With respect to Outer Continental Shelf leasing, and in consultation with the Secretary of the Interior, the Department of Energy (DOE) is authorized under the Department of Energy Organization Act, (91 Stat. 565 1977) to foster increased competition for leases, to implement authorized systems of bidding, to establish due diligence requirements for OCS operations, to set rates of production for leases, to define handling of royalty production, and to determine amounts of OCS gas purchased and transported. DOE has broad authority over approval, design, and economies of common carrier gas pipelines.

In addition, the Department of Energy provides support to the Leasing Liaison Committee, whose function is to coordinate leasing policies of the Department of the Interior with DOE policies. Section 27 of the OCS Lands Act, as amended, requires DOI consultation with DOE.

The Federal Energy Regulatory Commission (FERC), within DOE, has the authority under the Natural Gas Act to issue certificates of public convenience and necessity for proposed projects involving the transportation or sale of natural gas in interstate commerce. All natural gas produced from the OCS is considered to be interstate and therefore, is subject to FERC jurisdiction. The Natural Gas Act, the National Environmental Policy Act, and OCS Lands Act Amendments of 1978 all grant authority for or require that the FERC investigate the environmental effects of a proposed offshore project, as well as the potential gas reserves, the need for this gas, and the availability of capital to develop this resource. Also, the FERC is primarily responsible for administering and enforcing the Natural Gas Policy Act (NGPA) of 1978 (92 Stat. 3350). As applied to OCS matters, the NGPA provides new wellhead pricing controls for certain natural gas produced from the OCS.

Environmental Protection Agency: Under the Federal Water Pollution Control Act (FWPCA) Amendments of 1972, (86 Stat. 816), a National Pollution Discharge Elimination System (NPDES) was created and applies to discharges into the territorial seas, waters of the contiguous zone, and the oceans. The NPDES applies to fixed platforms and drillships, and any discharges from these sources would require a permit issued by the Environmental Protection Agency (EPA). Discharges of pollutants without the necessary permits from EPA are unlawful. Such an NPDES permit does not apply to discharge of pollutants from any vessels or floating craft, or subsurface injection wells for production purposes. Subsurface injection is subject to USGS regulations and operating orders.

The Clean Water Act (91 Stat. 1566 1977), which amended the FWPCA, also applies to offshore operations and provides that lessees or operators may be held financially liable for damages due to oilspills. It provides for a liability up to $50 million for actual costs of oil removal and cleanup (except where without fault of operator or owner), as well as replacement or restoration costs of natural resources damaged or destroyed by a spill.

EPA is also primarily responsible for facilities not related to transportation, such as terminal and storage facilities, and permits for any discharges would be issued by EPA or designated States according to established effluent guidelines. Provisions of the Clean Water Act also apply to onshore facilities and OCS-related activities.

Interstate Commerce Commission: The Interstate Commerce Commission grants approval of the tariff rates for transportation of oil by common-carrier pipelines.

International Conventions: Control over international waters in the Gulf of Alaska is now regulated by a number of international agreements and conventions applicable to specifically defined areas. The international treaties determined to be applicable to this proposal are as follows:

- North Pacific Fur Seal Convention (NPFSC)
- International Pacific Halibut Convention (INPHC)
- International Whaling Convention (IWC)
- International North Pacific Fisheries Convention (INPFC)
- U.S./Japan and U.S./U.S.S.R. King Crab Agreements
- Canada-U.S. Reciprocal Fishing Agreement

The first Law of the Sea Conference, held in 1958, resulted in 4 Law of the Sea Conventions: the territorial sea and the contiguous zone; the high seas; the continental shelf; and fishing and conservation of living resources on the high seas. Still unresolved questions from these conventions include the breadth of the territorial seas and the precise limits on the continental shelf. Nine Law of the Sea Conferences have been held to date, the latest in March 1979. Although agreement has been reached on a 200-mile economic zone, wherein coastal states have control of all marine resources, the charter providing for a 12-mile territorial sea limit has not been ratified.

Additionally, under the auspices of the Endangered Species Act of 1973 (P.L. 93-205), the United States recognizes that it is but a sovereign state in the international community attempting to conserve the various species of fish or wildlife and plants facing extinction. Pursuant to such recognition, the United States, under section 2 of this Act, supports international agreements and conventions including but not limited to the following:

- migratory bird treaties with Canada and Mexico
- the Migratory and Endangered Bird Treaty with Japan
- The convention on Native Protection and Wildlife Preservation in the Western Hemisphere
- The International Convention for the High Seas Fisheries of the North Pacific Ocean
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora
- Convention with the Union of Soviet Socialist Republics on the Conservation of Migrating Birds and Their Environment

E. Relationship of the Proposed Sale to the Overall OCS Leasing Program

Section 18(d)(3) of the OCS Lands Act, as amended, provides interim authority, pending development and approval of a new OCS leasing program under that act, to consider and decide whether to hold proposed OCS sale 55. That section provides that "leasing shall be permitted to continue until a new OCS leasing program is approved." In compliance with the act, the Secretary of the Interior submits a new proposed leasing program to the Congress, the Attorney General, and the Governors of affected States. The Secretary is further directed to prepare, periodically revise, and maintain the oil and gas leasing program. The leasing program is to consist of a schedule of proposed lease sales indicating, as precisely as possible, the size, timing, and location of leasing activity which will best meet national energy needs for the 5-year period following its approval or reapproval. The goal of the leasing program is to provide for orderly development of OCS oil and gas resources and to maintain an adequate contribution of OCS production to the national supply in order to reduce dependence on foreign oil.

- as an immediate objective that will become even more important in the future, reduce dependence on foreign oil and vulnerability to supply interruptions;

- in the medium term, to keep U.S. imports sufficiently low to weather the period when world oil production approaches its capacity limitation; and

- in the long-term, to have renewable and essentially inexhaustible sources of energy for sustained economic growth.

Full development of OCS resources is an integral part of that plan (The National Energy Plan, Executive Office of the President, Energy Policy and Planning, 1977).

The DES on the Proposed 5-Year OCS Oil and Gas Lease Schedule was released in August 1979. Public hearings were held in Anchorage in October, and the FES released in February 1980.

An OCS leasing program does not represent a decision to lease. It represents only the Department's intent to consider leasing in certain areas, and to only proceed with the leasing of such areas if it should be determined that leasing and development in such areas would be environmentally, technically, and economically acceptable.

F. Lease Stipulations

1. History of Mitigating Measures: The mitigating measures or proposed lease stipulations were developed both by the Bureau of Land Management, other DOI resource agencies through the Secretarial Order 2974 coordination process, key State of Alaska resource agency representatives, and representatives of the National Marine Fisheries Service in response to some of the environmental concerns expressed throughout the scoping, environmental assessment, and public testimony processes.

The two stipulations relating to pipelines and wells are included to help mitigate any potential gear conflicts with the commercial fisheries in the proposed lease area. These commercial fisheries are part of the maintenance of the fisheries and subsistence lifestyle of Yakutat. This was one of the key scoping issues to be considered in the EIS. These two stipulations on pipelines and wells were proposed early on in the 2974 process prior to publication of the draft EIS and carried through the FEIS process. In addition to other forms of mitigation such as the Fisherman's Compensation Fund, and the tract deletions offered in some of the Alternatives, the commercial fisheries in the proposed lease area should be amply protected.

The orientation stipulation was incorporated early on in the environmental assessment process and the 2974 process prior to the DEIS in order to bring potential leases and industry employees to a full degree of awareness of the significant environmental concerns in the Yakutat area.

The orientation stipulation also responds quite effectively to environmental concerns expressed in the public comment process and was incorporated throughout the 2974 process into the FEIS.

The Cultural Resource Stipulation was included early on in the environmental assessment and 2974 processes prior to the DEIS and in recognition of the fact that cultural resources in close proximity to the Yakutat forelands, the Tongass National Forest, and National Monument additions were a part of the results of the scoping process. This stipulation was carried all the way through the 2974 processes to the FES.

In special response to some of the public testimony concerning aircraft harassment of coastal bird and mammal rookeries, an information to lessees providing for an aircraft buffer zone of these areas was developed in coordination with the Fish and Wildlife Service and National Marine Fisheries Service. This particular mitigating measure originated after the public comment process and has progressed through the 2974 process and appears here in the FEIS.

The Alsek River gas pipeline route which was discussed in detail in the DES is not considered in detail in the FES. This pipeline route, which was considered to be a likely result of this proposed sale, if commercial quantities of gas were found, received numerous comments during the public review of the DES. On the basis of these comments and on further consideration of the subject by the BLM analysts preparing the FES, it was determined that the Alsek River pipeline route is not a likely outcome of this proposed sale, due to the incompatibility of a pipeline with current land status and land use plans for this onshore region. However, any pipeline to shore which might eventually result from this proposal would be subject to all pertinent Federal, State, and local permitting authorities and would be subject to environmental analysis pursuant to the National Environmental Policy Act (NEPA) of 1969.

2. Committed Mitigating Measures: The following mitigating measures are part of existing Federal rules and regulations (30 CFR Part 250).

a. OCS Operating Orders: Refer to Appendix B for the analysis of the Gulf of Alaska OCS Operating Orders prepared by the Geological Survey. Revised OCS Orders appeared in the December 21, 1979, issue of the Federal Register.

b. 30 CFR 250 Federal Regulations.

c. Stipulation for Protection of Cultural Resources: If the Supervisor (Area Supervisor, Geological Survey), having reason to believe that a site, structure, or object of historical or archaeological significance, hereinafter referred to as a "cultural resource", may exist in the lease area, gives the lessee written notice that the lessor is invoking the provisions of this stipulation, the lessee shall upon receipt of such notice comply with the following requirements:

Prior to any drilling activity or the construction or placement of any structure for exploration or development on the lease, including but not limited to, well drilling and pipeline platform placement, hereinafter in this stipulation referred to as "operation", the lessee shall conduct remote sensing surveys to determine the potential existence of any cultural resource that may be affected by such operations. All data produced by such remote sensing surveys, as well as other pertinent natural and cultural environmental data, shall be examined by a qualified marine survey archaeologist to determine if indications are present suggesting the existence of a cultural resource that may be adversely affected by any lease operation. A report of this survey and assessment prepared by the marine survey archaeologist shall be submitted by the lessee to the Supervisor and the Manager, Bureau of Land Management (BLM), Outer Continental Shelf (OCS) Office, for review.

If such cultural resource indicators are present, the lessee shall (1) locate the site of such operation so as not to adversely affect the identified location; or (2) establish, to the satisfaction of the Supervisor, on the basis of further archaeological investigation conducted by a qualified marine survey archaeologist or underwater archaeologist using such survey equipment and techniques as deemed necessary by the Supervisor, either that such operation shall not adversely affect the location identified or that the potential cultural resource suggested by the occurrence of the indicators does not exist.

A report of this investigation prepared by the marine survey archaeologist or underwater archaeologist shall be submitted to the Supervisor and the Manager, BLM OCS Office, for their review. Should the Supervisor determine that the existence of a cultural resource which may be adversely affected by such operation is sufficiently establised to warrant protection, the lessee shall take no action that may result in an adverse effect on such cultural resource until the Supervisor has given directions as to its preservation.

The lessee agrees that if any site, structure, or object of historical or archaeological significance should be discovered during the conduct of any operations on the lease area, he shall report immediately such findings to the Supervisor and make every reasonable effort to preserve and protect the cultural resource from damage until the Supervisor has given directions as to its preservation.

d. Stipulation for Orientation Program: The lessee shall include in any exploration and development plans submitted under 30 CFR 250.34 a proposed environmental training program for all personnel involved in exploration or development activities (including personnel of the lessee's contractors and subcontractors) for review and approval by the Supervisor (Area

Supervisor, Geological Survey). The program shall be designed to inform each person working on the project of specific types of environmental, social, and cultural concerns which relate to the individual's job. The program shall be formulated and implemented by qualified instructors experienced in pertinent fields of study, and shall employ effective methods to insure that personnel understand and use techniques necessary to preserve archaeological, geological, and biological resources to include bird and sea mammal rookeries, insuring avoidance and non-harassment of wildlife resources. The program shall also be designed to increase the sensitivity and understanding of personnel to community values, customs, and lifestyles in areas in which such personnel will be operating.

The lessee shall also submit for review and approval a continuing technical environmental briefing program for supervisory and managerial personnel of the lessee and its agents, contractors, and subcontractors.

e. Stipulation for Pipelines:

1. Pipelines will be required (a) if pipeline right-of-way can be determined and obtained; (b) if laying such pipelines is technically feasible and environmentally preferable; and (c) if, in the opinion of the lessor, pipelines can be laid without net social loss, taking into account any incremental costs of pipelines over alternative methods of transportation and any incremental benefits in the form of increased environmental protection or reduced multiple use conflicts. The lessor specifically reserves the right to require that any pipeline used for transporting production to shore be placed in certain designated management areas. In selecting the means of transportation, consideration will be given to any recommendation of any intergovernmental coordinating committee. All pipelines, including both flow lines and gathering lines for oil and gas, shall be designed and constructed to provide for adequate protection from water currents, storm and ice scouring, subfreezing conditions, and other hazards as determined on a case-by-case basis.

2. Following the development of sufficient pipeline capacity, no crude oil will be transported by surface vessel from offshore production sites, except in the case of emergency. Determinations as to emergency conditions and appropriate responses to these conditions will be made by the Supervisor.

3. Where the three criteria set forth in the first sentence of this stipulation are not met and surface transportation must be employed, all vessels used for carrying hydrocarbons to shore from the leased area will conform with all standards established for such vessels, pursuant to the Ports and Waterways Safety Act of 1972 (46 U.S.C. 391a).

f. Stipulation for Wells and Pipelines:

(a) Wells: Subsea well-heads and temporary abandonments, or suspended operations that leave protrusions above the sea floor, shall be protected, if feasible, in such a manner as to allow commercial trawl gear to pass over the structure without snagging or otherwise damaging the structure or the fishing gear. Latitude and longitude coordinates of these structures along with water

depths, shall be submitted to the Supervisor. The coordinates of such structures will be determined by the lessee utilizing state-of-the-art navigation systems with accuracy of at least ± 50 ft (15.25 m) at 200 mi (322 kms).

(b) Pipelines: All pipelines, unless buried, including gathering lines, shall have a smooth-surface design. In the event that an irregular pipe surface is unavoidable due to the need for valves, anodes or other structures, they shall be protected in such a manner as to allow trawl gear to pass over the object without snagging or otherwise damaging the structure or the fishing gear.

3. Other Mitigating Measures: The following measure is proposed as an Information to Lessee:

Aircraft Disturbance: To reduce the impacts of aircraft distrubance at seabird colonies and marine mammal rookeries along the coast, a distance of at least one-half mile from the coastline and an altitude of 1500 feet should be maintained from Yakutat Bay to Dry Bay during the period of May 1 to September 15. Lessee is advised that all violations may be reported to the U.S. Fish and Wildlife Service, National Marine Fisheries Service, or the Alaska Department of Fish and Game, as appropriate, for disposition. Human safety will take precedence over the provisions of these restrictions.

In addition to the protection of the human and ecological environment through the application of CFR 250 (30), and the USGS OCS Operating Orders (Gulf of Alaska Orders; December 21, 1979; Federal Register), and committed mitigating measures, the following discussion is offered to show the affected communities that additional Federal assistance may be available.

Federal Grant Assistance: There are additional mitigating measures available to the city of Yakutat. These take the form of planning assistance, because Yakutat is a first class city with planning and zoning capabilities as outlined in AS 29. Yakutat's planning and zoning capabilities are by themselves mitigating measures.

Four Federal grant programs have had, and do have, funding available for land use planning. The first of these is Special Economic Development and Adjustment Assistance Program (known as Title IX) of the Economic Development Administration. A Title IX study was done by Alaska Consultants in 1978, but present assumptions and scenarios are different in many cases. There is funding available for comprehensive community planning under the Department of Housing and Urban Development's 701 program which was done for the city of Yakutat. A 701 study was done in 1976, but again, the assumptions and scenarios have changed or are outdated.

There are 2 grant programs under the Coastal Zone Management Act. The first under Section 306 gives coastal states funds to plan for the allocation of land and water resources in their respective coastal zones. In Alaska, funding is available to local governments via the state to undertake this kind of planning. Section 308 provides for coastal energy impact program funding, available in the form of grants and loans and bond guarantees to (1) provide upfront public services and facilities necessitated by energy development, and (2) mitigate the loss of environmental and recreational resources.

There are other assistance programs available for airports, roads, ports and harbors, sewage treatment plants, etc., on an individual basis.

4. Effectiveness of Mitigating Measures: The following determination of the summary potential effectiveness of mitigating measures represents due consideration by the National Park Service, U.S. Geological Survey, Heritage Conservation and Recreation Service, Fish and Wildlife Service, National Marine Fisheries Service, and Bureau of Land Management. This is in addition to established regulations contained in 30 CFR Part 250 and revised Gulf of Alaska OCS Orders (December 21, 1979; Federal Register).

The Cultural Resource Stipulation was considered to be reasonably effective except perhaps in the area of artifacts or other cultural resources buried beneath the seabed. The problem is that many of these kinds of objects are beyond the limits of state of the art remote sensing technology which of necessity would probably be used to search for buried artifacts.

The Orientation Stipulation was considered to be highly effective in that it broadened the awareness of workers in the proposed lease area of many significant environmental concerns.

The two stipulations on pipelines and wells were considered to be quite effective overall. They were considered especially useful because of their broad application on wells and pipelines on a lease regardless of the common carrier, flowline, or gathering system nature of the actual pipeline involved.

Additionally, an information to lessees has been incorporated to provide lessees with an awareness of the necessity of avoiding shoreline bird and mammal rookeries with aircraft. This was considered to be a proven and effective way of preventing any unnecessary harassment type of problems from even developing. The historical experience of lessees abiding by and paying respect to information to lessees has been high throughout the history of the national OCS program.

I. ALTERNATIVES INCLUDING PROPOSED ACTION

A. Resource Estimates and Production Assumptions: Undiscovered recoverable resources may be defined as those quantities of oil and gas which are reasonably expected to exist in favorable geologic settings, but are completely undiscovered, and which after discovery can reasonably be expected to be produced with present technology and under existing economic conditions. If exploration confirms the existence of recoverable oil and gas, such resources are reclassified as reserves.

The resource estimates assume that favorable geologic conditions exist such that oil and gas are present and are contained in traps within the proposed lease area in commercial quantities. The possibility that the area is devoid of oil and gas in commercial quantities is not considered in our resource estimates.

There is a 95 percent probability that no commercial resources will be discovered. This is considered to be rather high for the proposed lease area since there may be only 1 chance in 20 for a producible discovery. This risk factor is subject to modification as more is learned about the area. Estimates of resource potential are inherently speculative; particularly in areas where geologic information is limited and the presence of oil and gas has not been demonstrated.

In the 1-in-20 case that commercial hydrocarbons are discovered, shallow- to medium-depth formations may contain oil and gas, and deeper zones are expected to contain gas. The probability of discovering gas rather than oil is estimated in the ratio of 3:1.

The resource estimates include primary production only; no assumption has been made regarding secondary or tertiary recovery. Differing assumptions regarding secondary or tertiary oil recovery, techniques, drilling and exploration technology, and economic conditions would affect the estimates, and, in the case of a producing field, actual recovery would be affected. Improvement of drilling technology and exploration science might also increase the estimates. Differing assumptions regarding the future of finding and development costs, operating expenses, the price of oil and gas, taxes, depreciation, and royalty and production rates would affect the estimates of the recoverable resources. Similarly, a significant change in one or several of these factors in the future could affect the amount of resources actually recovered, assuming discovery.

The Geological Survey has estimated that in the 1-in-20 case that oil and gas is discovered, the maximum, mean, and minimum levels of recoverable oil and gas resources within the proposed lease area would probably be as follows:

Range of Resources Assuming a Resource Find

	Maximum	Mean	Minimum
Oil (millions of barrels).....	800	450	250
Gas (trillions of cubic feet)...	2.25	1.25	0.7

Note: In the 1-in-20 case where resources are found, the maximum case has a 5 percent chance of being equaled or exceeded, and the minimum case has a 95 percent chance of being equaled or exceeded. The mean case ia an average of the resources found in those situations where resources are by assumption found. Therefore, the mean, maximum, and minimum can only be considered representative of a situation which has a mere 5 percent likelihood of occurrence.

For the purpose of analytic clarity, the BLM/Alaska OCS Office has assumed that recoverable resources for alternatives to the proposal will approximately match those of the mean case. Accordingly, the environmental analysis of each of the alternatives, including the proposed action, will be based on the assumption that full development of any of the alternatives would result in production of 450 million barrels of oil and 1.25 trillion cubic feet of gas.

In summary, the resource assumptions used herein assume the 1-in-20 case where oil and gas is discovered and produced from the proposed lease area. There is no assurance resources will be discovered and developed. However, the analysis of potential environmental effects proceeds on the assumption that these implied activities will be the nature of the action. The reader is cautioned to keep these qualifications in mind, placing in perspective the potential for and magnitude of northeastern Gulf of Alaska development.

B. Analysis of the Proposal and Its Alternatives:

1. Alternative I - Proposed Action:

a. Description of the Proposal: The proposed Federal action under consideration is the leasing of 350 blocks in the eastern Gulf of Alaska directly south of Yakutat. These blocks cover an area of approximately 792,085 hectares (1,957,242 acres) and are located about 6 - 93 kms (4 - 58 mi) offshore in water depths of about 30 - 400 m (99 - 1320 ft). A summary of these blocks by water depth and distance to shore is in Appendix C.

In January 1979, the Geological Survey (USGS) estimated that, based on geophysical data, the 350 blocks proposed to be leased have a 1-in-20 or 5 percent chance of containing undiscovered recoverable resources ranging from 250 million to 800 million barrels of oil, and from .7 trillion to 2.25 trillion cubic feet of gas. Based on these estimates, the proposed action may (under the mean case), result in a peak daily production of 140,300 barrels of oil, and 198 million cubic feet of gas. The estimated production life of this proposed oil and gas project is 37 years.

b. Basic Development Assumptions: Environmental, social, and economic impacts proceed from an assumption that some sort of action, such as a Federal decision to permit exploration for a commercially producible offshore oil field, is likely to take place. For the purpose of this statement, estimated levels of recoverable oil and gas discovered are a prime determinant in estimating the amount of activity and impact in OCS leasing.

In the past, OCS environmental impact statements (EIS's) were based on the premise that the maximum estimated oil and gas resources would be discovered and produced. In statistical terms, a reasonable analogy to the term "maximum estimated resources" might equate to a 1-in-20 chance of discovering the specified amount of oil and gas, if any is discovered, and only a 1-in-400 chance of discovering the specified amounts, based on presently known facts.

Previous impact assessments for other OCS sales, based upon the maximum discovery, were made to give the most consideration to the environment by estimating maximum impact. This procedure did not result in estimating the most probable impacts, given the existing information available. The procedure, in fact, incorporated a bias towards overestimation of impacts and infrastructure requirements, and it therefore diminished its value for impact assessment purposes.

This EIS adopts a middle-of-the-road approach in estimating potential development activity. Estimation of oil and gas development activity is focused on the intermediate level of assumed resource discovery, which is representative of general resource development situations having a 1-in-20 chance of occurrence. The intermediate case received the focus of environmental assessment.

The minimum and maximum cases, along with other issues and alternatives of concern, are assessed, and their significant environmental impacts are noted. The minimum and maximum cases, however, are not portrayed at the same level of detail as the intermediate case. The end result is a shift in emphasis to the

representative case, rather than a change in object or content. The obvious advantage of this approach is that assessments, decisions, recommendations, and analyses will be based upon a more representative level of oil and gas production which can occur if resources are found. The reader should bear in mind that this representative level does not have a 50 percent probability of occurring, but does have a 2.5 percent chance of occurrence.

Estimated Activity Resulting from the Proposed Action: The amount of commercial activity that may be generated in the Gulf of Alaska as a result of this proposal depends upon many variables. Chief among these variables would be the availability of capital, manpower, equipment, and the amount of proven recoverable resources. The quantity of recoverable resources (oil and gas) is unproven, and therefore, is presented as 3 levels (scenarios) in order to show an estimated range of resource potential. This range of resource potential has been discussed briefly in sec. I.A. and is in the form of detailed development scenarios and schedules of investment and production in Appendix A. The following discussion of estimated activity will be presented for the mean case (25 percent probability of occurring).

Estimated Activity Based on Mean Scenario: The following development scenario represents a reasonable prognostication of how, when and where the oil and gas resources are likely to be developed by private industry--not the Federal Government--if the Federal Government's proposed action, or its alternatives, to lease offshore oil and gas rights to private industry were to result in a commercial discovery following appropriate exploration activities. For a better understanding of the scenario information and consequent environmental impacts, it is necessary to recognize that the various prognosticated development patterns associated with this alternative do not represent a proposed action or decision at this time. The only action being proposed is the leasing of offshore OCS oil and gas rights under a variety of alternative locations, terms, and conditions of probable leases. The prognosticated development scenario as described in the following section is not to be construed as the proposed action at this time. These prognosticated probable development patterns, however, do represent a reasonably probable course of action that could be taken by private industry subsequent to a sale and possible commercial discoveries. Any hypothetical course of action by industry subsequent to a lease sale would, of course, be subject to all appropriate Federal, state, and local laws, regulations and public involvement. Because the development scenarios included in this EIS represent some probable degree of occurrence, it is extremely important to recognize that other development patterns as yet unknown could in reality also occur, subject to governmental laws, regulations, and public involvement; including a development stage EIS.

Exploration is expected to begin in 1981 and continue through 1985 with a total of 14 exploration and delineation wells drilled. No more than 2 rigs are assumed to be working during any year. Jack-up rigs could be used in shallow water and drillships and semi-submersibles could be used in deeper water.

Primary support/supply activities would be based at the existing Yakutat facility owned by Atlantic Richfield Co. (ARCO) with some marine traffic utilizing the existing facilities at Seward. These facilities would be

capable of handling all necessary marine support activities with no further expansion during the exploratory phase. Aircraft support would be conducted at the state-owned airport at Yakutat with Cape Yakataga being used as an auxilliary support area during bad weather.

If initiated, the development phase would begin in 1984 with the expansion of the support/supply base at Yakutat. An additional 10 hectares (25 acres) are anticipated for this expansion. In 1985, 2 steel-jacketed, bottom-founded production platforms would be installed with 70 production and service wells drilled between 1987 and 1991.

There is a possibility that under certain circumstances peculiar to an individual company, a small capacity LNG plant similar to the one at Kenai, Alaska, could be economically feasible under the mean case development pattern. Assumption of a gas pipeline to Yakutat and LNG plant (if commercial) would be the same as described under the maximum scenario.

Pipeline construction would start in 1986 and will continue through 1988. A total of 96 km (60 mi) of 20-in oil pipeline would be constructed, of which 80 kms would be offshore. All offshore pipeline would be placed by a lay barge or reel barge, as appropriate.

An oil terminal would be constructed in 1988 adjacent to Monti Bay (Yakutat). A storage capacity of about 850,000 bbls of oil would be sufficient. Oil and gas production is estimated to begin in 1989 with oil production ceasing in 2007 and gas ceasing in 2023.

The assumed locations of all onshore facilities as well as offshore pipelines are illustrated in figure I.B.1.a.-1. A summary of activities required to develop the estimated mean reserves are on Table I.B.1.a.-1.

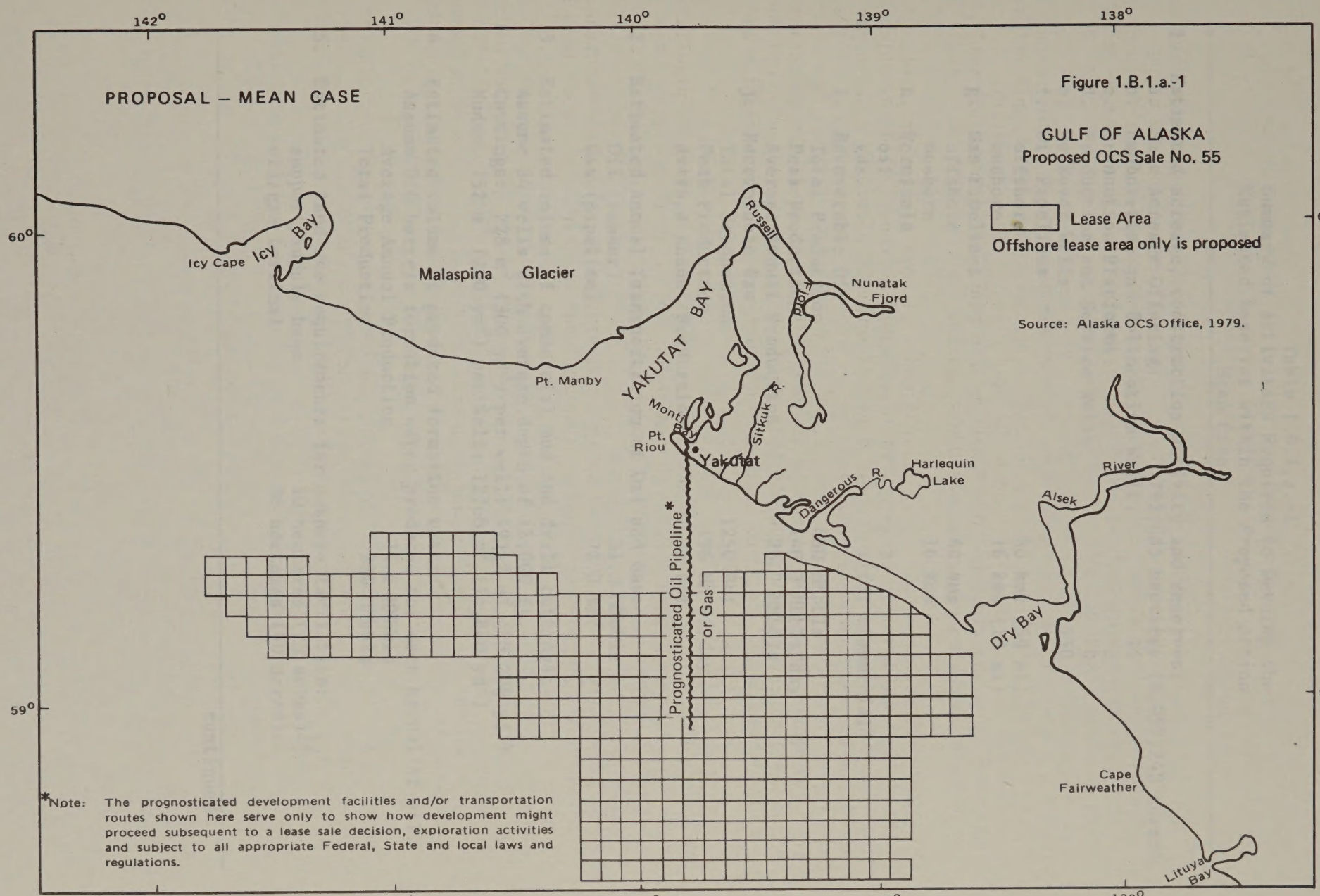
Estimated activities based on the minimum and maximum scenarios are discussed in Appendix A. The maximum scenario also includes the construction of an LNG plant near Yakutat.

Possible Offshore Loading Scenario: A barge connected to a single buoy mooring (SBM) device would be installed 32 - 48 kms (20 - 30 mi) offshore in 1988. It is estimated that a storage capacity of 850,000 bbls of oil would be sufficient. The production of oil and gas is estimated to begin in 1989 with oil production ceasing in 2007 and gas in 2023.

c. Summary of Probable Impacts: The following is a list of impacts which can be expected to be more likely to occur if the first alternative (proceed with the proposal as described in sec. I.A and B) is selected.

Potential major impacts resulting from Alternative I - Proceed with Action:

1. Maintenance of subsistence and community lifestyle
2. Local economy of Yakutat
3. Commercial fishing
4. Endangered species


142°
141°
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138°
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59°
PROPOSAL – MEAN CASE
Figure 1.B.1.a.-1
GULF OF ALASKA
Proposed OCS Sale No. 55
Lease Area
Offshore lease area only is proposed
Source: Alaska OCS Office, 1979.
Icy Cape
Icy Bay
Malaspina Glacier
Pt. Manby
YAKUTAT BAY
Russell Fjord
Nunatak Fjord
Monti Bay
Pt. Riou
Yakutat
Sitkuk R.
Dangerous R.
Harlequin Lake
Alsek River
Dry Bay
Prognosticated Oil Pipeline*
or Gas
Cape Fairweather
Lituya Bay
*Note: The prognosticated development facilities and/or transportation routes shown here serve only to show how development might proceed subsequent to a lease sale decision, exploration activities and subject to all appropriate Federal, State and local laws and regulations.

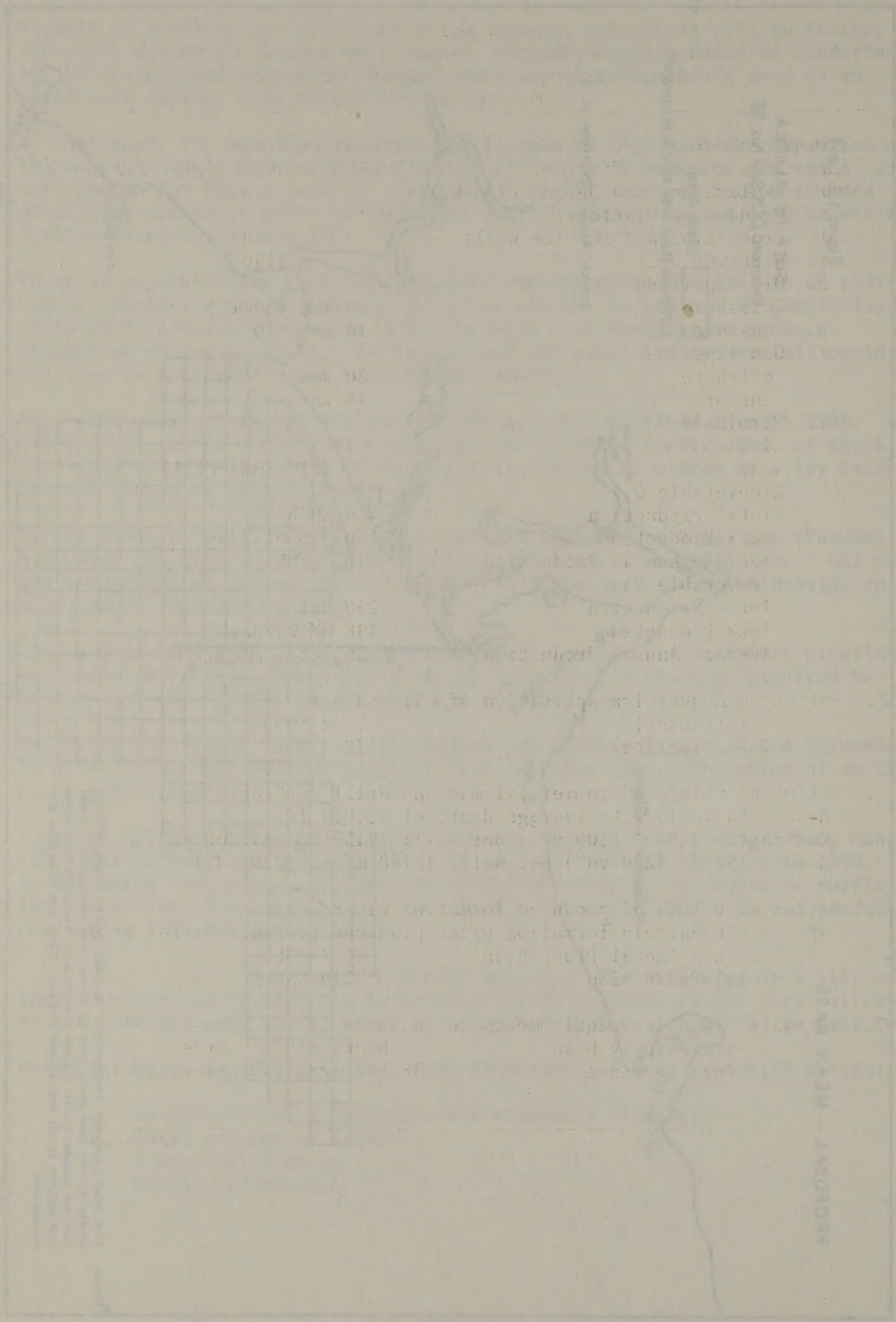


Table I.B.1.a.-1
Summary of Activities Required to Develop the
Estimated Reserves within the Proposed Action
Mean Case

1. Estimated acreage, construction activity and reserves:

a.	Sale Acreage Offering:	792,085 hectares (1,957,242 acres)
b.	Exploration and Delineation Wells:	14
c.	Production Platforms:	2
d.	Production and Service Wells:	70
e.	Workover Wells:	150
f.	Oil Pipelines	
	offshore	80 kms (50 mi)
	onshore	16 kms (10 mi)
g.	Gas Pipelines	
	offshore	80 kms
	onshore	16 kms
h.	Terminals	
	oil	1
	gas	1 (if commercial)
i.	Recoverable Oil	
	Total Production	450 MMbbls
	Peak Production	140.3 Mbbls/day
	Average Annual Production	23.7 MMbbls
j.	Recoverable Gas	
	Total Production	1250 Bcf
	Peak Production	198 MM cf/day
	Average Annual Production	35 Bcf

2. Estimated Annual Transportation of Oil and Gas:

Oil (tanker)	51.2 MMbbls
Gas (pipeline)	72.3 Bcf

3. Estimated volume of commercial mud and drill cuttings:
Assume 84 wells with average depth of 15,000 ft.
Cuttings: 228 m^3 (300 yd^3) per well: 19152 m^3 (25,200 yd^3)
Muds: 152 m^3 (200 yd^3) per well: 12768 m^3 (16,800 yd^3)

4. Estimated volume of produced formation water:
Assume 0.6 barrels formation water produced for each barrel of oil.

Average Annual Production	14.2 MMbbls
Total Production	270 MMbbls

5. Estimated land use requirements for onshore facilities:

support/supply base	10 hectares (25 acres)[1/]
oil/gas terminal	36 hectares (90 acres)

continued

Table I.B.1.a.-1
(continued)
Summary of Activities Required to Develop the
Estimated Reserves within the Proposed Action
Mean Case

6. Estimated Pipeline Burial Disturbance:
   offshore assuming 1.4 ha/km
   (6 a/mi): 240 hectares (600 acres)
   onshore assuming 1.8 ha/km
   (7 a/mi): 584 hectares (1460 acres)

1/ The 25 acres constitute the expansion of the existing facility at Yakutat.

5. Cultural resources
6. Air quality
7. Water quality

The maintenance of Yakutat's community lifestyle, subsistence living, commercial fishing activities, and local economy have been recognized throughout the scoping and environmental assessment process as being not only the more important issues to be considered in this EIS, but also those issues which would be most likely to be affected under the proposal as described. Only strict enforcement of the enclave development assumption could guarantee the affected community of Yakutat a significant reduction in the potential degree of impact on their lifestyle.

The following is a brief summary of the more significant impacts of proposed OCS Sale 55 on the basis of results of the scoping and environmental assessment processes.

One of the primary causes of concern to the people of Yakutat is that the exploration and production of oil and gas in the area will lead to a dramatic increase in population, decrease in subsistence gathering, and changes in the current lifestyle. The city of Yakutat is well aware of possible impacts, and with these and other concerns in mind, Yakutat has developed the Yakutat Comprehensive Development Plan (Alaska Consultants, 1976) and the City of Yakutat Capital Improvements and Services Program (Alaska Consultants, 1978).

The State of Alaska, the city of Yakutat, the Yak-Tat-Kwaan, Inc., and the Yakutat village Native corporation, effectively control the available land in the Yakutat area, either by direct ownership and/or zoning powers. It is assumed that these organizational entities, with the cooperation of the oil and gas companies, would cause all the exploration, development, and production personnel, less the individuals employed from Yakutat, to live in enclaves which the companies would need to construct.

If the assumption of an enclave style of development (an industrial compound, both physically and socially separated from the community of Yakutat) is enforced, then overall impacts on the lifestyle of Yakutat would be significantly moderated. If, however, the enclave assumption is not implemented adequately, then the impact of onshore facilities construction and operations would be most severe on the lifestyle of Yakutat.

The additive effect of the proposal, including a possible LNG plant at Yakutat and other developmental activities in the Yakutat area such as increased commercial bottomfishing activities, increased tourism, and recreational activities, as well as any unforeseen local commercial development projects in Yakutat, would undoubtedly result in a moderate impact on the lifestyle of Yakutat over the proposed life of the project. The effects of other OCS sales such as LCI, 60, and 46 would not impact Yakutat.

Land use changes will be especially critical at the local level, specifically in Yakutat, where there may be a tendency to realize short-term gains from selling or leasing lands to accommodate petroleum-related facilities. Induced

populations could bring about major changes in land ownership, especially in residential areas.

There will be direct demands for land in order to explore, develop, produce, and transport oil and gas resources. There will also be secondary demands for space from secondary employment, support facilities, and induced populations.

Cumulative impacts associated with the oil terminal would be those secondary or indirect impacts on land use associated with the terminal. There would be impacts if additional land were required for housing construction workers and if land use patterns were altered appreciably because of a need for additional support and supply facilities and pipeline routes.

The present support and supply facilities in Yakutat are probably adequate to handle further exploratory activity. Additional services associated with the supply base may locate in the commercial district, but the present area in the commercial district should be able to handle expected demand. However, if other industry, such as bottomfisheries, locate in Yakutat, there may be a competing demand for secondary goods and services. Part and parcel of the lifestyle of Yakutat are the scenic qualities of the local area.

The scenario called for in the proposed action would result in a significant impact on the visual environment. The least of the visual impacts would occur within the area of the Yakutat Forelands. Adverse climate, distance, and changes in vegetation would largely eliminate the negative visual impacts of the offshore platforms. The most prominent case of visual impacts would occur in and around the township of Yakutat. The use of natural vegetation to screen the facilities and the burial of onshore pipelines would mitigate some adverse effects.

Because the subsistence lifestyle of Yakutat depends in part on the commercial fishing and subsistence hunting activities for moose, bear, and small game of the coastal and marine environs, the following summarizes the more significant biological impacts relevant to subsistence. In this regard, it is noted here that the coastal area between Dry Bay and Pt. Manby is potentially subject to the toxic effects of an oilspill emanating from somewhere in the proposed lease area and reaching shore in less than 3 days. Oilspills circulating offshore for as long as 30 days are unlikely to impact the coastline either east of Cape Fairweather or west of Kayak Island.

There is a possibility that groundfish, halibut, and herring populations may be reduced by some unquantifiable amount during the life of this proposal. Adverse events would probably only occur in 1 year during the project, and should they occur when the larvae of these species are not present (about 6 months of the year), little or no effects would be attributable to oil and/or gas production. Should the larvae be present during the events, only those that actually come in contact with an oil slick or the water soluble fractions of oil around or below the slick would be adversely affected.

Should oil be discovered elsewhere in the eastern gulf, or a tanker from Valdez cause a pollution event, little or no effect on Yakutat area salmon populations would likely occur because the prevailing Alaskan Current would

tend to transport an offshore spill northwesterly, away from the Yakutat Forelands shoreline.

The major impact of this proposal on salmon species would be a reduction of their populations because of a major oilspill event. Because of their habits, chinook, sockeye, chum, and coho populations would be impacted in a minor way even if a spill occurred during the outmigration of young. Population reduction cannot be quantified, although it is estimated that the results would not show, especially in the normal variation of the catch of this species.

Pink salmon populations, however, could be reduced by 100,000 to 200,000 fish because of a worst case event. Should this happen during a year of normally low populations (even years), a further reduction of these weak-year populations would carry over some years into the future. How long it would take the population to return to normal is unknown, as is the total of the decline and recovery.

There is a possibility that populations of tanner and dungeness crab could be reduced by activities associated with oil and gas production in the proposed sale area. Egg and larval forms are most susceptible to adverse impacts from pollutant events associated with the project. Extent of impact will vary by time of year, amount and kind of event, and the area the event takes place in and covers.

The extent of population reduction cannot be estimated. Chronic pollution events covering egg release and larval rearing areas could reduce the populations of these areas substantially. The results of population reduction will show up in the commercial catch, however, because there is commercial harvest of these species. Assessment of the cause of population reduction will be difficult. Therefore, it is possible that the subsistence and commercial fishing lifestyle could be seriously affected by a major oilspill near Yakutat.

In addition to the effects of a major offshore oilspill on fisheries, there are also some potentially significant impacts on sea otters, whales, and other marine mammals.

Oil contamination of shoreline or nearshore areas frequented by sea otters has the potential to reduce the sea otter population through habitat and food source contamination. While direct oil contact could cause eye damage in seals, and kidney damage by ingestion, other direct oiling effects on pinnipeds are inconclusive. Direct oiling of sea otters could disrupt thermoregulation through matting of the fur, leading to exposure and death. Oil contamination of rookeries, shoreline and nearshore habitats, and feeding areas could have serious impacts on marine mammals by destruction or contamination of food sources and abandonment of breeding areas. Recovery from such perturbations may occur provided cumulative and chronic factors associated with OCS development do not reduce the use of breeding and feeding habitats on a long-term basis.

An impact of major concern is the issue of effects on endangered species of whales. The specific endangered species of whales consists of: blue whale (Balaenoptera musculus), fin whale (Balaenoptera physalus), sei whale

(Balaenoptera borealis), humpback whale (Megaptera novaeangliae), right whale (Eubalaena glacialis), gray whale (Eschrictius robustus), and the sperm whale (Physeter catodon).

Although a major oilspill impacting a transient, migratory and highly mobile population of whales is an unlikely event, a summary of the potential affects of such an encounter are as follows:

Assume a very large spill (total of 120,000 bbls) that is continuous (60 days) occurs at the beginning of the whales' migration period.

Assuming that spilled oil is in the path of spring or fall migrating whales, an unpredictable number of the whales could be impacted. The oil could temporarily eliminate food sources, and possibly stress migrating whales. However, since whales could avoid large spills in open water, and since several species may not feed during migration, it is impossible to accurately predict how oilspills may affect whale feeding.

Toxic substances could possibly concentrate in whale tissue as a result of food web interactions. Such accumulation would probably be a function of long-term exposure throughout a species' range, rather than attributable to a single spill.

Exploration related noise and traffic may interfere with the whales' migration past the platform area. The significance of such effects will vary according to noise characteristics, duration, source and specific attributes of cetacean species.

Earlier exploration in sale 39, future exploration and development in Kodiak and Shelikof Strait, combined with sale 55, could exert additional stress on the individual endangered whales, or their habitat, to adversely effect the well being of these endangered species. TAPS tanker and commercial fishing activities also might contribute to cumulative effects. Additional boat and aircraft traffic may cause temporary or permanent displacement of certain endangered species. Such impacts may be most significant at passes and other restricted migration corridors used by cetaceans.

In conclusion, a plausible (but, in our judgment, highly unlikely) combination of oilspill events could occasionally and, at least temporarily, impact an unknown number of the season's migrating endangered whale population.

In closing this summary of impacts for the proposed action, it has been recognized that the historical past is often of considerable cultural importance to the collective lifestyle of a local community.

Development resulting from the proposed lease sale could cause both significant direct and indirect adverse effects on terrestrial archaeologic and historic sites. Direct impacts to cultural sites could result from off-lease construction activities, and oil contamination of site materials. Indirect impacts could result from the siting of oil and gas facilities adjacent to cultural sites, oiling of the cultural environment, and through the processes of salvage archaeology. Significant adverse effects on potential submerged

archaeologic sites could affect some unidentified or undetected sites. Although unlikely, potential sites could be affected by the siting of offshore facilities, an increase in siltation from construction activities, as well as an increase in marine traffic. A beneficial effect of the proposed action could result from site surveys and the systematic collection of cutural specimens.

Those impacts which have been determined during the scoping and environmental assessment process to be relatively minor have not been included here. In a few cases, discussion of selected impacts of marginal significance have been included in the appendices.

2. Alternative II - No Sale

a. Description of Alternative: This alternative is one of no action. A description of the impact of the future ecological and socio-economic environment under this option has been included in sec. III.A.3.

This alternative would have the affect of retaining the proposed sale area in its existing state for the continuation of current activities, as well as for consideration at some future time for preserving the area as is, or different use or management possibilities.

b. Energy Requirements and Conservation Potential: To delay or eliminate, in part or in whole, the proposed eastern gulf sale, would reduce future OCS oil and gas production, necessitate escalated imports of oil and gas, and/or require the development of alternate energy sources to replace the energy resources expected to be recovered if the proposed sale takes place.

Recent surpluses of Alaskan crude oil in southern California are short-term until permanent transportation systems are in place to move the crude to inland markets where it is needed. The oil and gas that could become available from the proposal over the next 37-year period could add to national domestic production. If this proposal is cancelled, an addtive impact of greater oil and gas deficits resulting in increased imports can be expected. If the subject sale were cancelled, the following energy actions or sources might be used as substitutes. However, some of these actions are not feasible at this time and may not be during the estimated life of this production area.

It is anticipated that the oil and gas that would be come available from this proposal in the next 37-year period could provide significant contribution to this region's energy supply; if the subject sale were cancelled, the following energy actions or sources might be used as substitutes:

-Energy conservation
-Conventional oil and gas supplies
-Coal
-Nuclear power
-Oil shale
-Hydroelectric power
-Solar energy

-Energy imports
    Oil imports
    Natural gas pipeline imports
    Liquefied natural gas imports
-Geothermal energy
-Other energy sources
-Combination of alternatives

This section briefly discusses these alternatives. For more detailed information on each of these energy sources and environmental impacts, refer to Energy Alternatives: A Comparative Analysis, (University of Oklahoma, 1975) prepared for the Bureau of Land Management by the Science and Public Policy Program of the University of Oklahoma.

Energy Conservation: Vigorous energy conservation is an alternative that warrants serious consideration. The Project Independence Report of the Federal Energy Administration claims that energy conservation alone can reduce energy demand growth by 0.7 to 1.2 percent depending on the world price of oil. Aside from these savings, it is now widely recognized that wasteful consumption habits impose social costs that can no longer be afforded, as do pollution and an inequitable distribution of fuel.

The residential and commercial sectors of the economy are often characterized as inefficient energy consumers. Inadequate insulation, inefficient heating and cooling systems, poorly designed appliances, and excessive lighting are often noticed in these sectors. Reductions in consumption beyond those induced by fuel price increases could be achieved by new standards on products and building, and/or subsidies and incentives. Such incentives include standards for improved thermal efficiency in existing homes and offices and minimum thermal standards for new homes and offices.

Excessive consumption is also evident in the industrial sector where energy inefficient work schedules, poorly maintained equipment, use of equipment with extremely low heat transfer efficiencies, and failure to recycle heat and waste materials are all commonplace. Estimated energy savings of between 10 and 30 percent may be available in this sector of the economy.

Transportation of people and goods accounts for approximately 25 percent of nationwide energy use. Energy inefficiency in the transportation sector varies directly with automobile usage. Automobiles, which account for 90 percent of all passenger movement in the nation, use more than twice as much energy per passenger mile as buses. Moreover, the average car carries only 1.3 passengers. Using short- and mid-term conservation measures such as consumer education, lower speed limits, rate and service improvements on public transit and rail freight transit, may achieve 15 to 25 percent in energy savings.

Other policies which could encourage fuel conservation in transportation include standards for more efficient new automobiles, and incentives to reduce miles traveled. An important new development in the fuel economy area could be the modification of the standard internal combustion engine. Although such an engine is now in the advance stages of development, further study by auto-

motive engineers, industry, and concerned Federal agencies is necessary before an acceptable engine may be designed.

Significant energy savings are clearly possible through accelerated conservation efforts. The Project Independence Report estimates that conservation alone could result in a 2.2 million barrel/day reduction in petroleum demand by 1985. In addition, several of the strategies mentioned above have been at least partially implemented by the Energy Policy and Conservation Act of 1975 (P.L. 94-163).

Environmental Impact: The environmental impact of a vigorous energy conservation program will be primarily beneficial. The exact nature and magnitude of these impacts will depend on whether there is a net reduction in energy use or whether the reduction is accomplished through technological change and substitutions. For the former, the net impacts will simply be that there are fewer pollutants of all kinds unleashed. As an example, the 2.2 million barrel/day savings by 1985 mentioned above would result in a diminishment nationwide of various pollutants by the following amounts (HUD Contract #H2026R: "Research Evaluation of a System of Natural Air Conditioning").

CO--4 lbs/1,000 gals = 189 tons/day
Hydrocarbons--3 lbs/1,000 gals = 142 tons/day
Particulates--23 lbs/1,000 gals = 1,088 tons/day
NO_x--60 lbs/1,000 gals = 2,838 tons/day
SO_2--157 lbs/1,000 gals = 7,426 tons/day

However, if energy conservation is achieved by technological change or substitution, the net reductions will be those above. Other impacts will be related or attributed to an OCS lease sale in another unidentified area or as described below.

Conventional Oil and Gas Supplies: Large quantities of oil and gas still remain in the United States. The Geological Survey reports that onshore crude oil measured reserves, as of December 31, 1974, were about 31 billion barrels; indicated reserves were 4.33 billion barrels, inferred reserves were 20.4 billion barrels with a 95 percent probability, and 81 billion barrels with a 5 percent probability.

Despite the magnitude of reserves, domestic oil production is likely to continue to decline from its peak production rate attained in 1970. All of the 12 oil production forecasts discussed in the Project Independence Blueprint claimed that, in the next few years, the United States petroleum production decline would continue. Most of these same forecasts predict increasing domestic production by the late 1970's, but only under the most favorable conditions in terms of prices, development of OCS resources, regulations, and environmental constraints.

The development of new reserves required to meet gas demand will depend on continued development of onshore areas and of commercially viable nuclear stimulation or massive hydraulic fracturing to produce natural gas from low permeability reservoirs. Additional domestic oil reserves are recoverable through secondary and tertiary extraction techniques.

However, the additional oil that is attainable in this manner is in many cases "old" and has been subject to price controls. These controls have diminished the incentive for using these sophisticated and expensive recovery methods.

In a study of future natural gas production rates, Duane and Karnitz concluded that the upper production limits of natural gas are now being approached. Two constraints are identified: the level of recoverable resources, and the production level that can be sustained for a reasonable time period. Once assumption of these 2 levels are made, there is not much room for variations in the maximum potentially attainable production rate. Assuming the current Potential Gas Committee's estimate of recoverable domestic natural gas resources (1,845 tcf for the U.S., including Alaska), the study considers 2 possible levels of natural gas production: 25-30 tcf/year under optimistic conditions, and 20-25 tcf/year under less optimistic conditions.

A detailed description of the crude oil and natural gas systems is found in Chapters 3 and 4 of Energy Alternatives: A Comparative Analysis.

To substitute directly for the subject sale, a combination of onshore and OCS production from other areas and continued foreign imports would be required to make up for the estimated total production of this proposed sale of 0.45 billion barrels of oil and 1.25 trillion cubic feet of gas, over a 37-year period. Alternatively, this is a .70 billion barrel oil equivalent or a 3.5 trillion cubic feet gas equivalent, which would need to be imported.

Environmental Impact: This substitution would entail environmental impacts such as land subsidence, soil sterilization, and disruption of existing land use patterns. Equipment failure, human error, and blowouts may also impair environmental quality. Moreover, poor well construction, particularly in older wells, and oilspills can result in ground and surface water pollution.

The water pollutants from onshore oil production are oil and dissolved solids. The amounts of each vary over a wide range. A summary of this is available in Energy Alternative: A Comparative Analysis.

Air pollutants (particulates, NO_x, hydrocarbons and CO) result from blowouts and subsequent evaporation and burning. These are generally insignificant, except locally. These effects will be basically the same, whether the production is onshore or offshore.

Given the fact that onshore supplies are dwindling, users of hydrocarbons from this proposal would have to continue their reliance on other regions and foreign imports for needed oil and gas. The decline in these supplies, even with energy conservation, could mean industrial shutdowns, increased unemployment, higher consumer prices, and changes in the standard of living. The lack of natural gas will mean additional use of "dirtier" alternative fuels (oil, coal) with consequent impacts on air quality and human health.

Coal: Coal is the most abundant energy resource in the United States. Coal deposits underlying nearly 460,000 square miles in 37 states constitute one-quarter of the known world supply, and account for 80 percent of our proven

fuel reserves. Proven reserves of coal contain 125 times the energy consumed in 1970. A detailed discussion of the coal resource system can be found in Chapter 1 of Energy Alternatives: A Comparative Analysis.

To replace the energy expected to be realized from the proposed eastern Gulf of Alaska sale, 156 million tons of coal would be necessary. Though domestic reserves could easily provide this quantity, serious limitations to coal development exist. In many uses, coal is an imperfect substitute for oil or natural gas. In many other cases, coal use and production is restricted by government constraints, limited availability of low sulfur deposits, inadequate mining, conversion and pollution abatement technology, and the hazardous environmental impacts associated with coal extraction and electricity generated from coal. Coal production is also threatened by the unique set of labor problems associated with mining and new strict standards for coal mine safety.

Although U.S. coal resources are very large, as with other extractable mineral fuels, there is some geographic dislocation. Most of our new low sulfur coal is found west of the Mississippi River or in Alaska, far from industrial areas. Also, much of the western coal is in arid or semi-arid areas where scarcity of water could constrain development.

If an alternative to the proposed OCS sale in the eastern Gulf of Alaska is greater reliance on coal, it may be expected that mining would increase in western states and Alaska to provide the necessary fuel source.

Environmental Impact:

Coal Utilization: Combustion of coal results in various emissions, notably SO_2 and particulates. If the expected production from this sale is replaced by coal, there will be an increase in these pollutants, especially if coal is substituted for the natural gas presently used. Technology to control these emissions is available, but has not yet been proven sufficient to be widely applied. The sulfur content of eastern coal varies considerably, but approximately 65 percent of the developed resources have a sulfur content exceeding 1 percent. Most of the U.S. low sulfur coal is located in the western states. Any large scale shift to coal would require relaxation of emission regulations or improvement of technologies to convert coal to gaseous or liquid fuels.

Surface Mining: The 156 million tons of coal that would be necessary to replace production from this proposed sale would require 1.2 large open-pit mines (assuming 5×10^6 tons annually for each). The primary impact of surface mining is disruption of the land. This affects all local flora and fauna, water quality, and increases landscape problems due to erosion and runoff from the mine. Reclamation is difficult in the western states due to the lack of water to assist in revegetation. Other problems include acid mine water drainage, leachings from spoil piles, processing waste, and the disturbance caused by access and transportation. Noise and vibration resulting from operations can also be expected. Finally, surface mining causes conflicts with other resource uses such as agriculture, recreation, water, and wildlife habitat.

The land use of strip-mining ranges from 0.18 to 5.19 acres/10^{12} BTU extracted, depending on seam thickness and BTU content of the coal. Assuming a figure of 2 acres/10^{12} BTU, the total surface disturbance to substitute coal for oil and gas from this proposed lease sale could be on the order of 7,680 acres.

Underground Mining: To replace the expected production from the proposed eastern Gulf of Alaska sale, 3.2 underground mines would be required (assuming 2 x 10^6 annual tons for each). Underground mining primarily affects land and water quality. The land impacts are those that arise from subsidence, waste disposal, access, and transportation. Very little surface is disturbed. Subsidence can destroy structures, cause landslides and earthquakes, and disrupt groundwater circulation patterns. The amount of subsidence can be controlled by the mining method used and the amount of coal removed. Both have detrimental effects on the economics of the operation.

Water quality is affected by both processing waste and the drainage of acid mine-water into surrounding areas. These can be minimized through the proper methods of control both during and after operations. Entrances can be sealed and waste piles can be replaced in the mine. This would also help minimize subsidence. There are also pollution problems associated with road and coal dust and the like, but these are minimal and easily controlled. Other disturbing aspects of mining have much less of an impact in an underground mine. Working conditions of underground mines have been improved under the Federal Coal Mining Health and Safety Act of 1969, although further efforts are needed to reduce health hazards. This program has resulted in increasing costs of underground mining relative to surface mining, which has even more severe environmental restraints and impacts.

Coal Transportation: The 5 major transportation systems (road, rail, water, conveyer, and pipeline) all have some adverse environmental impacts. These include air and noise pollution, safety, land use, trash disposal, and aesthetics. However, since spill problems are not associated with coal, most of the impacts can be controlled with greater care and consideration. A slurry pipeline also requires large supplies of water and must adequately dispose of this at the other end. Water availability is a problem in many areas of the U.S., especially in the west where energy resource requirements will have to compete with other existing commercial and private users for a limited and fragile supply.

Coal Conversion: Technology for conversion of coal into gaseous and liquid hydrocarbons has been established for several decades and a number of relatively low-capacity commercial plants exist in various parts of the world. However, few cost-effective advanced technologies have progressed beyond the pilot plant stage.

Numerous problems remain before commercial development of synthetic fuels from coal can proceed. Specific technical problems must be solved. The cost effectiveness of synthetic fuels from coal will depend on prices of other fuels, primarily oil and natural gas.

Control of adverse environmental effects will increase the cost of producing synthetic fuels. Possible constraints on development include technological

constraints, availability of skilled workers, raw materials (coal, water, steel), capital, and institutional constraints: government policies (energy resource leasing, coal mining regulations, permit procedures, etc.) and the willingness of industry to invest in development of new technologies.

Synthetic oil and gas could contribute substantially to energy supplies by the year 2000--up to 14 percent according to the synthetic fuels Inter-Agency Task Force (Report to the President's Energy Resources Council, November 1975). However, the most important contributors would be high-BTU gas from coal, and synthetic crude oil from oil shales. Prospects for coal liquefication and low-BTU gas appear less attractive. The success of these energy sources will depend on developing technology, the cost of the impacts, especially coal, and the cost of conventional oil and gas.

Coal Gasification: Gaseous fuels with low, intermediate, or high energy content can be produced. Low and intermediate gases are produced in a 2-stage process involving preparation and gasification, and the output is utilized as feedstock for electric generators. A third process, upgrading, is required to produce high-BTU gas, which produces an end product usable by the consumer.

Among low-BTU gasification processes under development are: Lurgi, Koppers-Totzek (both in commercial use), Bureau of Mines Stirred Fixed Bed, and Westinghouse Fluidized Bed. Among high BTU-gasification processes are: Lurgi High-BTU gasification process, HYGAS, BI-Gas, Synthane, and CO_2 Acceptor.

The environmental impacts of coal gasification are those of mining plus those resulting from the production processing. Gasification processes have lower primary efficiency than direct coal combustion; more coal will have to be gasified to reach an equivalent BTU output. However, it is likely that coal gasification will achieve primary efficiencies of 70 percent which is about twice that of coal to electricity end use. Water impacts of processing can be minimized by recycling and evaporation. However, large inputs of water are required for some of the technologies, thus creating the potential for conflicts in water-short areas. For example, a Koppers-Totzek gasifier producing 250×10^9 BTU per day will require water in the amount of 463,000 gallons per day and coal in the amount of 10,570 tons per day. To substitute for this proposed sale, 1.3 complexes would require 1 million gallons of water per day and 5.2 million tons of coal per year. The land use required for these plants, based on 330 acres per plant, would be 429 acres.

Air pollution could include sulfur dioxide, particulates, nitrous oxides, hydrocarbons, and carbon monoxides.

Land impacts result from solid waste disposal, plus land use for the plant, coal storage, cooling sands, etc. Solid wastes include ash, sulfur, and minute quantities of some radioactive isotopes.

Coal Liquefaction: As with coal gasification, production of liquid fuels from coal requires either addition of hydrogen or removal of carbon from the compounds in the coal. Coal liquefaction can be accomplished by hydrogenation, pyrolysis, or catalytic conversion. Only catalytic conversion is in

commercial operation. Among liquefaction processes under development are: synthoil, H-Coal, Solvent Refined Coal, Consol Synthetic Fuel, COED, TOSCOAL, and Fischer-Tropsch.

Again, the impacts of liquefaction will be those of mining and those of the processing plants. The available technologies have a recovery of from 0.5 to 3 barrels of oil per ton of coal processed.

Water effluents from liquefaction plants could contain amounts of phenols, solids, oil, ammonia, phosphates, etc. The waste water could be treated to remove most of these products.

Air pollution could result from particulates, nitrogen, sulfur oxides, and other gases. Pollution control facilities would be required, but would lower the economic attractiveness of the plants.

Solid wastes would be mostly ash. Residue could be buried in the mine with little further environmental impact, if liquefaction plants are sited at the opening of the mine.

Impacts from this alternative would probably be absorbed by states other than Alaska.

Nuclear Power: The predominant nuclear system used in the United States is the uranium dioxide fueled, light water moderated and cooled nuclear power plant. Research and development is being directed toward other types of reactors, notably the breeder reactor and fusion reactors.

As of December 31, 1975, 56 nuclear plants with capacity of 37,500 NW were licensed to operate. At the end of 1975 nuclear power generated about 8 percent of the nation's electricity. However, about half of the electric power capacity now under construction is nuclear powered. Nuclear power development has encountered delays in licensing and siting, environmental constraints, as well as manufacturing and technical problems. Future capacity will be influenced by the availability of plant sites, plant licensing considerations, environmental factors, nuclear fuel costs, rate of development of the breeder and fusion reactors, and capital costs. In order to meet future uranium fuel requirements, it will be necessary to locate additional ore reserves through increased exploratory drilling activity.

Fuel cycle costs of nuclear reactors have increased only slightly since 1965, from a range of about 17 - 22 cents per million BTU, to about 30 cents in 1974. Present trends in reactor capital costs are significantly narrowing the economic advantage offered by fuel cycle costs over coal and oil-fired plants.

Environmental Impact: Although nuclear plants do not emit particulates or gaseous pollutants from combustion, the potential for serious environmental problems exists. Some airborne and liquid radioactive materials are released to the environment during normal operation. The amounts released are very small and potential exposure has been shown to be less than the average level of natural radiation exposure. The plants are designed and operated in such a way that the probability of harmful radioactivity released from accidents is very low.

Nuclear plants use essentially the same cooling process as fossil-fuel plants and thus share the problem of heat dissipation from cooling water. However, light water reactors require larger amounts of cooling water and discharge greater amounts of waste heat to the water than comparably sized fossil-fuel plants. The effects of thermal discharges may be beneficial in some though not all cases. Adverse effects can often be mitigated by use of cooling ponds or cooling towers.

Low-level radioactive wastes from normal operation of a nuclear plant must be collected, placed in protective containers, and shipped to a Federally-licensed storage site for burial. High-level wastes created within the fuel elements remain there until the fuel elements are processed. Currently, spent fuel is stored at NRC-licensed facilities. Plans call for recovering unused fuels at reprocessing plants, solidifying the wastes, and placing them in storage at a Federal Repository.

Primary residuals from light water reactors are waste heat and radioactive emissions. For a 1,000 MW(e) plant operating at a 75 percent load factor, a 33 percent efficient nuclear plant would emit 47×10^{12} BTU's of waste heat annually. For comparison, a 40 percent efficient fossil-fuel plant would emit 36×10^{12} BTU's of waste heat.

To substitute for this proposed sale, it would take 2.85 1,000 MW(e) light water reactors to supply the equivalent energy, assuming 40 percent plant efficiency and 80 percent loading. First core loading of these plants would require 85 tons of enriched uranium (U_3O_8), with annual reloadings requiring over 25 tons total. This kind of substitution assumes that all oil and gas produced from this sale would generate electricity. Nationally, only 8 percent of oil and 18 percent of gas consumed is utilized to generate energy.

There are also impacts on land, water, and air quality arising from the mining of these uranium ores. Dwindling amounts of high grade reserves will increase the amounts of land mined for lower grade radioactive ores--primarily in western states. The mining operations will be similar to coal, but the nature and distribution of the deposits mean "lesser" impact while radioactive trailings cause unusual problems for disposal, the environment, and human health.

A more complete discussion of uranium mining and processing, the economics and environmental impacts, as well as nuclear fission and fusion can be found in Chapters 6 and 7 of Energy Alternatives: A Comparative Analysis.

Oil Shale: Large areas of the United States are known to contain oil shale deposits, but those in the Green River Formation in Colorado, Wyoming, and Utah, have the greatest commercial potential. The oil shale resources of the Green River Formation are estimated at 1,781 billion barrels, of which 129 billion barrels are classes one and two resources, 186 billion barrels are class three resources, and 1,466 billion barrels are class four resources.

To substitute the energy equivalent estimated to be produced from this proposed sale, .95 billion tons of oil shale would have to be mined and processed. Classes one and two deposits are at least 30 feet thick and average 30 gallons of oil per ton of shale, and include only the most accessible and better

defined deposits. Class three deposits are as rich as classes one and two, but more poorly defined and less favorably located. Class four deposits are lower grade, poorly defined deposits ranging down to 15 gallons of oil per ton of shale.

Environmental Impact: Oil shale development poses serious environmental problems. With surface or conventional underground mining, it is very difficult to dispose of the huge quantities of spent shale, which occupy a larger volume than before the oil was extracted. Inducing revegetation in an area of oil shale development is difficult and may take more than 10 years. In-place processing avoids many of these environmental hazards. The spent shale problem is much less severe with underground mining.

Air pollutants from the mining will come from dust and vehicular traffic. These will be predominantly particulates, followed by NO_x and CO, with minimal amounts of hydrocarbons, SO_x and aldehydes.

The mining of oil shale requires little water, both for operations and for reclaiming solid wastes. Water pollutants are considered negligible, but may arise if saline water were encountered during the operations and had to be disposed of.

However, the processing (retorting) operations consume large quantities of water and generate large amounts of waste water. The waste water must be treated and can be reused in the process. Therefore, it has been assumed that water pollution will not be a problem outside the complex. However, the limited availability of input water in the development area could lead to resource use conflicts.

Air pollutants vary with the technology used. Solid waste comprises the greatest problem of oil shale processing. The volume of the waste is greater than the volume of the input. Therefore, backfilling and the like would not provide a sufficient disposal space. Finally, there are the impacts of access and of transporting the products. These are analogous to those of coal mining in the case of access, and petroleum distribution in the case of transporting the product.

A fuller description of this energy source can be found in Chapter 2 of Energy Alternatives: A Comparative Analysis.

Hydroelectric Power: Hydropower is energy from falling water, which is used to drive turbines and thus produce electricity. Conventional hydroelectric developments convert the energy of natural regulated stream flows falling from a height to produce electric power. Pumped storage projects generate electric power by releasing water from an upper to a lower storage pool and then pumping the water back to the upper pool for repeated use. A pumped storage project consumes more energy than it generates, but converts offpeak, low value energy to high value peak energy. A more detailed discussion of this energy source is found in Chapter 9 of the Energy Alternatives: A Comparative Analysis.

Many of the major hydroelectric sites operating today were developed in the early 1950's. Thirty to forty years ago hydroelectric plants supplied as much as 30 percent of the electricity produced in the United States. Although

hydroplant production has steadily increased, thermal-electric plant production has increased at a faster rate.

As of May 1974, total conventional hydropower developed in the contiguous United States was 54,885 MW, nearly one-half of which was in the western states of Washington, Oregon, and California. Some 6,878 MW of conventional hydro capacity are now being installed, about 90 percent of which is in the western part of the country.

Much of recent hydroelectric development has been pumped storage capacity. As of May 1974, the total developed pumped storage capacity in the contiguous United States was 8,119 MW; capacity under construction was 6,253 MW.

The undeveloped potential for hydroelectric generation is about 93,000 MW in the lower 48 states and about 32,000 MW in Alaska. However, it is likely that hydroelectric power will continue to represent a declining percentage of the total U.S. energy mix due to the following: high capital costs, seasonal variations in waterflows, land use conflicts, environmental effects, water use, and flood control constraints. Sites with the greatest production capacity and lowest development costs have already been exploited.

Environmental Impact: Construction of a hydroelectric dam represents an irreversible commitment of the land resource beneath the dam and lake. Flooding eliminates wildlife habitat and prevents other uses such as agriculture, mining, and free-flowing river recreation.

Hydroelectric projects do not consume fuel and do not cause air pollution. However, use of streams for power may displace recreational and other uses. Water released from reservoirs during summer months may change ambient water temperatures and lower the oxygen content of the river downstream, adversely affecting indigenous fish. Fluctuating reservoir releases during peak load operation may also adversely affect fisheries and downstream recreation. Screens placed over turbines prevent the entrance of fish, but small organisms may pass through and may be killed.

Fish may die from nitrogen supersaturation, which results at a dam when excess water escapes from the draining reservoir. High nitrogen levels in the Columbia and Snake Rivers pose a threat to the salmon and steelhead resources of these rivers. Other adverse impacts to water quality include possible saline water intrusion into waterways and decreased ability of the waters to accommodate waste discharges.

Air quality will only be affected by dust and emissions during the construction phase. Afterwards, if the impoundment is used for recreation, motor exhaust would occur.

Solar Energy: Applications of solar energy must take into account the following:

Solar energy is a diffuse, low intensity source.

Its intensity is continuously variable with time of day, weather, and season.

Its availability differs widely between geographic areas.

Potential applications of solar energy show a wide range. Among them are:

Thermal energy for buildings -
Water heating, space heating, space cooling, combined systems
Renewable clean fuel sources -
Combustion of organic matter
Bioconversion of organic materials to methane
Pyrolysis of organic materials to gas, liquid, and solid fuels
Chemical reduction of organic materials to oil
Electric power generation -
Thermal conversion
Photovoltaic - residential/commercial, ground central station, space central station
Wind energy conversion
Ocean thermal difference

Environmental Impact: Although fuel costs for backup systems and maintenance costs for solar units are small when compared with operating costs of conventional heating and cooling systems, the high initial or "fixed" costs of solar units make them unattractive to many homeowners and builders. The typical solar heating system for a home costs $5,000-$6,000 (including costs of a standby conventional furnace) compared to $1,000-$2,000 for a conventional fossil-fuel home heating unit. However, the rising cost of the gas and oil needed by the conventional heaters means that, over time, the greater fixed costs of solar systems will be balanced by their lack of fuel costs.

Large-scale generation of electricity using solar energy is another promising application which is receiving increased funding. A number of technical and engineering problems now prevent commercialization of solar steam-electric plants, though pilot projects are well under way. It is estimated that solar electricity will be available on a significant scale in 10 - 15 years or more.

Additional detail on this resource alternative is found in Chapter 11 of Energy Alternatives: A Comparative Analysis (U.S. Government Federal Policy Task Force Review Group, Solar Energy Analysis, 1978; Solar Energy Progress and Problems, 1978, EPA, U.S. DOE, and Lawrence Berkeley Laboratories, et al.).

Among the disadvantages of solar energy are high capital costs, expensive maintenance of solar collectors, thermal waste disposal, and distortion of local thermal balances.

The impacts so far identified with solar energy are relatively minimal. The primary effects of the use of this energy source on a wide scale will be land use. Due to the low density of the energy, large areas will be necessary for the collectors. However, the land use compares favorably with other forms of energy use such as coal extraction.

The only other area for concern known so far is thermal pollution. Direct use in space heating has no thermal effects. However, for solar electric power generation, heat will have to be collected and transferred to the generator.

Some localized thermal pollution may occur as a result, but the problem is not expected to be significant. Finally, solar plants can only operate intermittently. Thus, the energy will have to be either stored, or backup fossil-fuel plants will have to be built. These will have their own sets of environmental constraints.

Oil Imports: U.S. reliance on imported oil has increased steadily in the last decade. Competition on the world market and recent cutbacks in Middle Eastern oil exports (oil embargo of 1973) have raised concerns about availability. Increasing domestic demand restricts potential imports from the Western Hemisphere nations, particularly Venezuela and Canada. Increasing imports from the Middle East brings problems of stability of supply, balance of payments, and U.S. offloading capacity. In February 1977, U.S. imports of petroleum and petroleum products were 7,724,000 barrels/day.

During calendar year 1976, the U.S. imported an average of 5,287,000 barrels of crude oil and 1,927,000 barrels of refined oil each day. The peak oil equivalent production of 170 million barrels per day from this proposed sale thus represents approximately 2 percent of daily U.S. crude imports. To import the equivalent barrels of oil needed to replace the oil and gas from this proposed sale would total approximately $16 a bbl x 670 million boe (barrels of oil equivalent) or nearly $11 billion.

Environmental Impact: The primary hazard to the natural environment of increased oil imports is the possibility of oilspills, which can result from accidental discharge, intentional discharge, and tanker casualties. Intentional discharges would result largely from uncontrolled unballasting of tankers. The effects of chronic, low-level pollution are largely unknown. The worldwide tanker casualty analysis indicates that, overall, an insignificant amount of the total volume of transported oil is spilled due to tanker accidents. However, a single incident such as the breakup of the Torrey Canyon in 1967 or the Amoco Cadiz in 1978 can have disastrous results. Of more concern than tanker spills is the impact to the social and economic environment. The potential for a future embargo under this option is such that American productivity and policy could become subservient to foreign influence. On a more subtle level, political alignments and policies of the United States could become tied to those of foreign oil powers. This option is the least acceptable for continued American energy independence.

Natural Gas Imports: Imports of natural gas via pipeline have come largely from Canada with small amounts from Mexico. In 1973, net pipeline imports from Canada were 1,028 bcf, about 4.6 percent of total natural gas used in the United States. These imports were about 33 percent of Canada's natural gas production. Natural gas pipeline imports from Mexico have not been a significant part of U.S. supply. In 1973, imports from Mexico were 1.6 bcf.

Mexico could be a significant source of future imports because of its relatively large natural gas resource base, the Tampico-Tobasco and other regions. Imports from Mexico were of a local nature until 1957 and have declined since 1969, but could be of major significance in the future. In addition, Canadian intentions to gradually phase out oil exports to the U.S. puts into question its U.S. natural gas pipeline exports. On February 28, 1979, Canada's National

Energy Board issued a report announcing a surplus of Canadian natural gas available for export. The Federal Energy Regulatory Commission is presently analyzing a proposal to import Canadian gas in quantities up to 1.04 Bcfd. The gas would be delivered through the proposed early construction of the southern portion of the Alaska Natural Gas Transportation System (ANGTS). The gas covered by this import authorization would be the first new export of Canadian gas under other than emergency circumstances since 1970. The Commission is also reviewing competing applications for this proposed import of Canadian gas.

Environmental Impact: The environmental impacts of increasing gas imports derive mainly from the possible increased use of land for pipeline construction. A further impact is the risk of explosions and fires. Fluctuations of that supply could influence quality of life, productivity, and employment. American policies could also become influenced by decisions of foreign gas producers, much as they could under the option of increasing oil imports.

Liquefied Natural Gas Imports: The growing shortage of domestic natural gas has encouraged projects to import liquefied natural gas (LNG) under long-term contract. Large scale shipping of LNG is a relatively new industry. Several LNG projects are now under consideration on the Pacific, Atlantic, and Gulf Coasts. Security of foreign LNG is questionable. The complexity of the length of time involved in implementing these proposals has been increased by the need for negotiating preliminary contracts, securing the approval of the Federal Power Commission and the exporting country, and making adequate provision for environmental and safety concerns in the proposed U.S. facilities. LNG import facilities are in operation at Everett, Massachusetts, Cove Point, Maryland, and Elba Island, Georgia. Future LNG projects include the approved construction of an LNG import terminal at Lake Charles, Louisiana, which is expected to begin receiving imported gas in the early 1980's. Also, on September 26, 1979, the Commission conditionally approved the construction of an LNG facility near Kenai, Alaska. This project would transport gas from fields in Cook Inlet to a proposed LNG plant in the Nikiski industrial complex in Alaska. LNG would then be transported by tanker and delivered to Point Conception, California, for regasification and sale to markets in southern California.

Environmental Impact: The environmental impacts of LNG imports arise from tankers; terminal, transfer, and regasification facilities; and, transportation of gas. The primary hazard of handling LNG is the possibility of a fire or explosion during transportation, transfer, or storage.

Receiving and regasification facilities will require prime shoreline locations and dredging of channels. Regasification of LNG will release few pollutants to the air or water.

LNG imports will influence the U.S. balance of payments. This impact will depend on the origin and purchase price of the LNG, the source of the capital, and the country (U.S. or foreign) in which equipment is purchased and LNG tankers are built.

Geothermal Energy: Geothermal energy is primarily heat energy from the interior of the earth. It may be generated by radioactive decay of elements such as uranium or thorium, and friction due to tidal or crustal plate motions.

There are 4 major types of geothermal systems: hot water, vapor dominated, geopressured reservoirs, and hot dry rock systems.

In addition to electricity, geothermal energy can offer a potential for space heating, industrial processing, and other nonelectric uses in many areas which presently are highly dependent upon oil and gas for energy needs. However, geothermal electric generating plants are smaller than conventional plants and require a greater amount of steam to generate the equal amount of energy. This is due to the fact that temperatures and pressures associated with geothermal areas are lower than those created at conventional poser plants. In some areas, geothermal resources may have potential for space heating, industrial processing, and other nonelectric uses.

The greatest potential for geothermal energy in the U.S. is found in the Rocky Mountain and Pacific regions; some potential exists in the Gulf Coastal Plain of Texas and Louisiana. The geyser field in California is the most extensively developed source of geothermal energy in the U.S. It has been producing power since 1969. Exploration efforts are also under way in the Imperial Valley, Salton Sea, Mono Lake, and Modoc County, California.

Within 20 years, geothermal energy may account for about 1 to 2 percent of total U.S. energy and about 5 percent of California's total energy consumption.

Environmental Impact: A number of gases are associated with geothermal systems and may pose health and pollution problems. These gases include ammonia, boric acid, carbon dioxide, carbon monoxide, hydrogen sulfide, and others. However, adverse air quality impacts are generally less than those associated with fossil-fuel plants. Also associated with geothermal energy systems are saline waters which must be disposed of and isolated from contact with ground water regimes.

Land quality problems stem from disturbance due to construction of related facilities, and possible ground subsidence which, in turn, can cause structural failures and loss of ground water storage capacity.

Other Energy Sources: The high cost and rapidly shrinking reserves of the traditional energy fuels have encouraged research into new and different sources for potential energy. Some of these alternate sources have been known for decades, but high costs and technical problems have prevented their widespread use. They include tidal power, wind power, organic fuels, and ocean thermal-gradients, among others.

Environmental impacts of these alternatives are difficult to assess, especially as a great amount of research and development remains to be completed before operational scale systems can be developed, tested, and evaluated for production and application.

The date of commercial availability of such alternatives will depend on the cost of the traditional energy fuels, the level of Federally subsidized research through ERDA assistance, and the solution of engineering and technical problems.

Combination of Alternatives: Within Alaska and wherever this fuel will be used, a combination of some of the most viable energy sources available to this area, discussed above, could be utilized to attain an energy equivalent comparable to that estimated to be produced within the 37-year field life anticipated by this proposed action. However, this combination of alternatives, in order to attain the needed energy mix peculiar to the infrastructure of this area, would have to consist of energy sources attainable now or within the 37-year timeframe that are transferable to the technology presently used, i.e., viable substitutes would have to be available for the petroleum and natural gas required by the petrochemical industrial complex, the petroleum used for the transportation sector, and the electricity and fuels used in residential and commercial sectors.

Part II of the Energy Alternatives: A Comparative Analysis, particularly Chapter 16, "Comparing the Economic Costs of Energy Alternatives," discusses the factors that must be involved in developing technically and economically appropriate energy alternatives.

The most viable domestically available energy alternatives, technologies and economies allowing, would probably consist of the use of coal (for use in coal-fired power plants), coal gasification plants (to provide synthetic natural gas), nuclear power and solar energy (to provide energy for space heating), and oil shale processing (to provide petroleum), in addition to conventional oil and gas resources. The environmental impacts of each of these alternatives has been discussed briefly in the previous sections.

Based upon the range of undiscovered recoverable resources estimated by the USGS for the proposed eastern Gulf of Alaska sale area, table I.B.2.a.-1 presents the energy equivalents which would be required for other energy sources to substitute for this proposed action.

The future U.S. energy source mix will depend on a multiplicity of factors, among them the identification of resources, research and development efforts, development of technology, rate of economic growth, the economic climate, changes in lifestyle and priorities, capital investment decisions, energy prices, world oil prices, environmental quality priorities, government policies, and availability of imports.

The Project Independence Report estimated U.S. energy demand and domestic supply for 4 cases. These data are shown below (see tables I.B.2.a.-2 and -3).

The increases in domestic supply under the accelerated supply case are due largely to the following:

Standardization and expedited licensing to increase nuclear capacity 15% by 1985.

Significant new leasing, exploration, and development of the Pacific, Gulf of Alaska, and Atlantic OCS.

Additional oil and gas pipelines from Alaska to the lower 48 states.

Increased Federal leasing and actions to allow additional oil shale production.

Opening National Petroleum Reserves #1 and #4 to full scale commercial development.

Possible mandatory allocation or other actions to assure critical materials and equipment to meet expected production levels.

For the base case, the Project Independence Report envisions the role of alternative energy sources as the following:

Petroleum production is severely constrained in the short run and greatly affected by world oil prices in the long run. Before 1977 there was little that could have prevented domestic production from declining or at best remaining constant.

Coal production will increase significantly, but is limited by lack of markets. Increases are limited by rate of electric growth, increasing nuclear capacity, and environmental restrictions.

Potential increases in natural gas production are limited.

Nuclear power is expected to grow from 4.5 - 30 percent of total electric power generation.

Synthetic fuels will not play a major role between now and 1985.

Shale oil could reach 250,000 B/D by 1985 at $11 world oil prices, but would be lower if $7 prices prevail.

Geothermal, solar, and other advanced technologies are large potential sources, but will not contribute to our energy supplies until after 1985.

In the interest of clarity of presentation, the early parts of this section have discussed separately each potential alternative form of energy as a possible substitute to the proposed sale. However, it is unlikely that there will ever be a single definitive choice between energy sources, or that development of one source will preclude development of others. Different energy sources will differ in their rate of development and the extent of their contribution to total U.S. energy supplies. Understanding of the extent to which they may replace or complement offshore oil and gas requires reference to the total national energy picture. Relevant factors are:

Historical relationships indicate that energy requirements will grow at approximately the same rate as the gross national product.

Energy requirements can be constrained to some degree through the price mechanisms in a free market or by more direct constraints. One important type of direct constraint operating to reduce energy requirements is through the substitution of capital investment in lieu of energy, e.g., insulation to save fuel. Other potentials for lower energy use have more far-reaching impacts and may be long range in their implementation--they include rationing, altered transportation modes, and major changes in living conditions and lifestyles. Even severe constraints on energy use can be expected to only slow, not halt, the growth in energy requirements within the timeframe of this statement.

Energy sources are not completely interchangeable. For example, solid fuels cannot be used directly in internal combustion engines. Fuel conversion potentials are severely limited in the short term, although somewhat greater flexibility exists in the longer run and generally involve choices in energy-consuming capital goods.

The principal competitive interface between fuels is in electric power plants. Moreover, the full range of flexibility in energy use is limited by environmental considerations.

A broad spectrum of research and development is being directed to energy conversion--more efficient nuclear reactors, coal gasification and liquefaction, liquefied natural gas (LNG), and shale retorting, among others. Several of these could assume important roles in supplying future energy requirements, though their future competitive relationship is not yet predictable.

Major potential for filling the supply/demand imbalance for domestic resources are:

- More efficient use of energy.
- Environmentally acceptable systems which will permit production and use of larger volumes of domestic coals.
- Accelerated exploration and development of all domestic oil and gas reserves.
- Development of the nation's oil shale resources.

Of the foregoing, increased domestic oil and gas production offers considerable possibilities, although adequate incentives must exist for indicated and undiscovered domestic resources to be discovered and extracted.

The acceptability of oil and gas imports as an alternative is diminished by:

The security risks inherent in placing reliance for essential energy supplies on sources which have demonstrated themselves to be politically unstable and prone to use interruption of petroleum supplies to exert economic and political pressure on their customers.

The aggravation of unfavorable international trade and payments balances which would accompany substantial increases in oil and gas imports.

Apparent high costs of liquefying and transporting natural gas other than overland by pipeline.

Alternatives IV and V would have similar energy substitution implications.

c. Summary of Probable Impacts: For Alternative II, the no-sale case, all the environmental impacts have been determined to be relatively insignificant. Further description of the future ecological and socio-economic environment has been included in sec. III.

3. Alternative III - Delay the Sale

a. Description of Alternative: This alternative displaces the timing of the proposal as previously described into some unknown future timeframe. The impact of this option has been included in sec. III.A.4.

b. Summary of Probable Impacts: For Alternative III, the delayed sale case, the more likely impacts are as follows:

1. Maintenance of subsistence and community lifestyle
2. Local economy
3. Commercial fisheries
4. Endangered species
5. Cultural resources
6. Air quality
7. Water quality
8. CZMA - district plan

Although these impacts are the more likely, they would be delayed to some future timeframe.

If Yakutat's capital improvement plan and district CZM plan (refer to CZM discussion in sec. III) were completed during a delay of sale, and assuming adequate application of the enclave development assumption, then potential impacts on the lifestyle of Yakutat would be significantly reduced.

A delay-of sale for a reasonable period of time would undoubtedly enable the city of Yakutat an opportunity to develop a district coastal management plan within the framework of the State's CZM plan.

Land use changes will be especially critical at the local level, specifically in Yakutat, where there may be a tendency to realize short-term gains from selling or leasing lands to accommodate petroleum-related facilities. Induced populations could bring about major changes in land ownership, especially in residential areas.

There will be direct demands for land in order to explore, develop, produce, and transport oil and gas resources. There will also be secondary demands for space from secondary employment, support facilities, and induced populations.

Cumulative impacts associated with the oil terminal would be those secondary or indirect impacts on land use associated with the terminal. There would be impacts if additional land were required for housing construction workers, and

if land use patterns were altered appreciably because of a need for additional support and supply facilities and pipeline routes.

The present support and supply facilities in Yakutat are probably adequate to handle further exploratory activity. Additional services associated with the supply base may locate in the commercial district, but the present area in the commercial district should be able to handle expected demand. However, if other industry, such as bottomfisheries, locate in Yakutat, there may be a competing demand for secondary goods and services. Part and parcel of the lifestyle of Yakutat are the scenic qualities of the local area.

The scenario called for in the delay-of-sale alternative would result in a delay of significant impacts on the visual environment. The least of the visual impacts would occur within the area of the Yakutat Forelands. Adverse climate, distance, and changes in vegetation would largely eliminate the negative visual impacts of the offshore platforms. The most prominent case of visual impacts would occur in and around the township of Yakutat. Although the use of natural vegetation to screen the facilities and the burial of onshore pipelines would mitigate some adverse effects.

Because the subsistence lifestyle of Yakutat depends in part on the commercial fishing and subsistence hunting activities for moose, bear, and small game of the coastal and marine environs, the following summarizes the more significant biological impacts relevant to subsistence. In this regard, it is noted here that the coastal area between Dry Bay and Pt. Manby are potentially subject to the toxic effects of an oilspill emanating from somewhere in the proposed lease area and reaching shore in less than 3 days. Oilspills circulating offshore for as long as 30 days are unlikely to impact the coastline either east of Cape Fairweather or west of Kayak Island.

There is a possibility that groundfish, halibut, and herring populations may be reduced by some unquantifiable amount during the life of this proposal. Adverse events would probably only occur in 1 year during the project, and should they occur when the larvae of these species are not present (about 6 months of the year), little or no effects would be attributable to oil and/or gas production. Should the larvae be present during the events, only those that actually come in contact with an oil slick or the water soluble fractions of oil around or below the slick would be adversely affected.

Based on oilspill trajectories and the estimate of 1 major spill during the life of the project, there is a 25-30 percent chance that 1 year class (the year of the spill) will be adversely affected. Amount of population decrease cannot be quantified, but would probably not be measurable in the local commercial fishery.

Should oil be discovered elsewhere in the eastern gulf, or a tanker from Valdez cause a pollution event, little or no effect on Yakutat area salmon populations would likely occur because the prevailing Alaska Current would tend to transport an offshore spill away from shore.

The commercial fishery on these shellfish species would have the most effect on population maintenance over any other commercial venture in the foreseeable future.

The major impact of this delay-of-sale alternative on salmon species would be to delay impacts on their populations because of a major oilspill event. Because of their habits, chinook, sockeye, chum, and coho populations would be impacted in a minor way even if a spill occurred during the outmigration of young. Delayed population reduction cannot be quantified, although it is estimated that the results would not show, especially in the normal variation of the catch of this species.

Pink salmon populations, however, could be reduced by 100,000 to 200,000 fish because of a worst case event. Should this happen during a year of normally low populations (even years) a further reduction of these weak-year populations would carry over some years into the future. How long it would take the population to return to normal is unknown as is the total of the decline and recovery.

There is a possibility that populations of tanner and dungeness crab could be reduced by activities associated with oil and gas production in the proposed sale area. Egg and larval forms are most susceptible to adverse impacts from pollutant events associated with the project. Extent of impact will vary by time of year, amount and kind of event, and the area the event takes place in and covers.

The extent of a delayed population reduction cannot be estimated. Chronic pollution events covering egg release and larval rearing areas could reduce the populations of these areas substantially. The results of population reduction will show up in the commercial catch, however, because there is commercial harvest of these species. Assessment of the cause of population reduction will be difficult.

Therefore, it is possible that the subsistence and commercial fishing lifestyle could be seriously affected by a major oilspill near Yakutat.

In addition to the effects of a major offshore oilspill on fisheries, there are also some potentially significant impacts on sea otters, whales, and other marine mammals. However, under the delay-of-sale alternative, impacts on marine mammals and fisheries would be delayed into the future.

Oil contamination of shoreline or nearshore areas frequented by sea otters has the potential to reduce the sea otter population through habitat and food source contamination. While direct oil contact could cause severe and possible permanent eye damage in seals, and kidney damage by ingestion, other direct oiling effects on pinnipeds are inconclusive. On the other hand, direct oiling of sea otters can disrupt thermoregulation through matting of the fur, leading to exposure and death. Oil contamination of rookeries, shoreline and nearshore habitats, and feeding areas could have serious impacts on marine mammals by destruction or contamination of food sources and abandonment of breeding areas; however, recovery from these perturbations may occur provided cumulative and chronic effects from oil and gas development, and accompanying development, do not eliminate or significantly reduce the use of important breeding and feeding habitats.

Although a major oilspill impacting a transient, migratory and highly mobile population of whales is an unlikely event, a summary of the potential affects of such an encounter are as follows. Under the delay-of-sale alternative, the following impacts would be delayed to sometime in the future.

Assume a very large spill (total of 120,000 bbls) that is continuous (60 days) occurs at the beginning of the whales' migration period.

Assuming that spilled oil is in the path of spring or fall migrating whales, an unpredictable number of the whales could be impacted. The oil could temporarily eliminate food sources, and possibly stress migrating whales. However, since whales could avoid large spills in open water, and since several species may not feed during migration, it is impossible to accurately predict how oilspills may affect whale feeding.

Toxic substances could possibly concentrate in whale tissue as a result of food web interactions. Such accumulation would probably be a function of long-term exposure throughout a species' range, rather than attributable to a single spill.

Exploration related noise and traffic may interfere with the whales' migration past the platform area. The significance of such effects will vary according to noise characteristics, duration, sources and specific attributes of cetacean species.

In conclusion, a plausible although highly unlikely combination of oilspill events could occasionally and, at least temporarily, impact an unknown number of the season's migrating endangered whale population.

Those impacts which have been determined during the scoping and environmental assessment process to be relatively minor have not been included here. Further discussion of those impacts associated with the delay-of-sale alternative can be found in the environmental consequences section.

4. Alternative IV - Modify the Sale by Deletion of the Nearshore Area:

Rationale: The deletions offered under this alternative represent a balanced determination between a number of environmental concerns as described in the following and the compelling requirement for still offering for lease an area with some reasonable chances of discovery of potential hydrocarbon resources. These determinations reflect the results of the scoping, environmental assessment, and public review process which included among many inputs particular coordination with the Geological Survey and other resource agencies in order to provide a balanced environmental-hydrocarbon resource analysis.

To provide a buffer for major salmon rearing and spawning area; major sea mammal and sea bird rookeries.

Also for protection of cetacean migration routes near the coast. This protective buffer also encompasses the major inshore commercial and subsistence fishery areas which are germane to the maintenance of the fisheries lifestyle of Yakutat and their local economy which is based on it.

This buffering concept for protection of fisheries and mammal resources was developed during the scoping and environmental assessment process in coordination with other State and Federal resource agencies.

In addition, the deletion of these nearshore tracts would provide a protective degree of space from onshore National Monuments and the Tongass National Forest, not only from a visual and wilderness protective resource perspective, but also to buffer additional development activities from occurring in too close a proximity to these coastal wilderness resources.

These deletions also provide for almost the complete elimination of potential commercial and subsistence fisheries activity conflicts with OCS related activities offshore. This will further facilitate the maintenance of Alternative IV. Tracts to be deleted are:

764	808	853	899
765	809	854	900
766	810	855	901
767	811	856	902
768	812	857	903
769	813	858	904
770	814	859	905
	815	860	906
	816	861	
	817	862	
947	992	1037	25
948	993	1038	26
949	994	1039	27
950	995	1040	28
951	996		
952			

a. Description of Alternative: This alternative involves the leasing of 289 blocks in the eastern Gulf of Alaska directly south of Yakutat; 61 blocks less than the proposed action. The blocks deleted are those in the nearshore area (northeast portion of proposal) adjacent to the coastal area east of Yakutat. The blocks proposed for leasing comprise an area of approximately 667,737 hectares (1,649,978 acres). They are located from approximately 26 - 88 kms (16 - 55 mi) offshore and in water depths of approximately 90 - 400 m (297 - 1320 ft). The blocks are summarized by water depth and distance to shore in Appendix C.

Based on Geological Survey geophysical data, the BLM/Alaska OCS Office estimates the 289 blocks in this alternative have a 1-in-20 or 5 percent probability of containing undiscovered recoverable resources of 450 million barrels of oil and 1250 billion cubic feet of gas. The estimated production life of this alternative is 37 years. Fewer tracts proposed for leasing in this alternative as compared to alternative I, probably increase the dry hole risk factor to some degree.

Estimated Activity Resulting from Alternative IV: The potential development scenario for this alternative is the same as those described under the proposal in Alternative I.

The assumed locations of all onshore facilities as well as offshore pipelines and the blocks included in the alternative are illustrated in figure I.B.4.a.-1. A summary of presumed activities required to develop the estimated reserves are on table I.B.1.a.-1.

b. Summary of Probable Impacts: For Alternative IV (as previously described), which in essence is a nearshore tract deletion, the more likely impacts are:

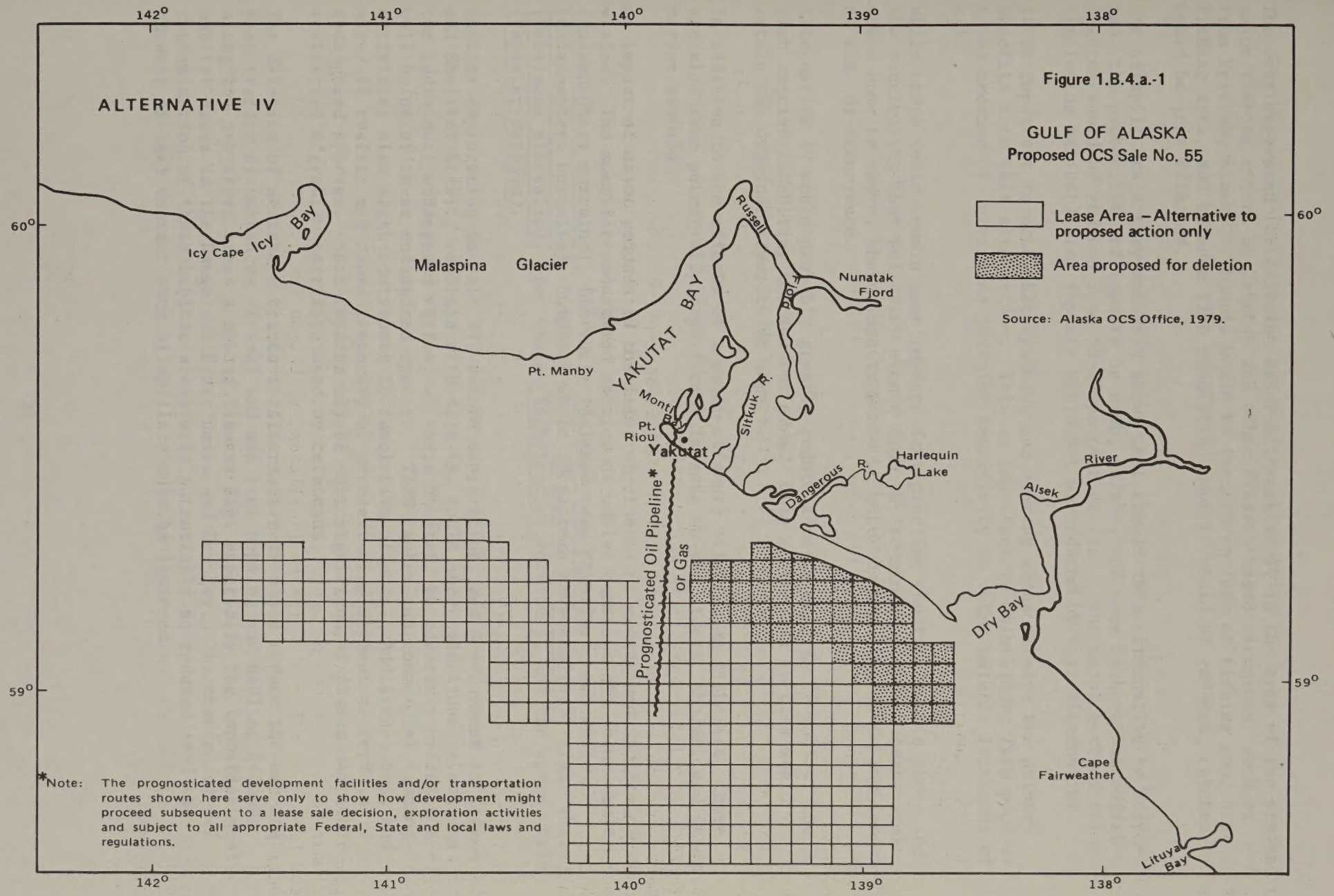
1. Maintenance of subsistence and community lifestyle
2. Local economy
3. Commercial fisheries
4. Endangered species
5. Cultural resources
6. Air quality
7. Water quality

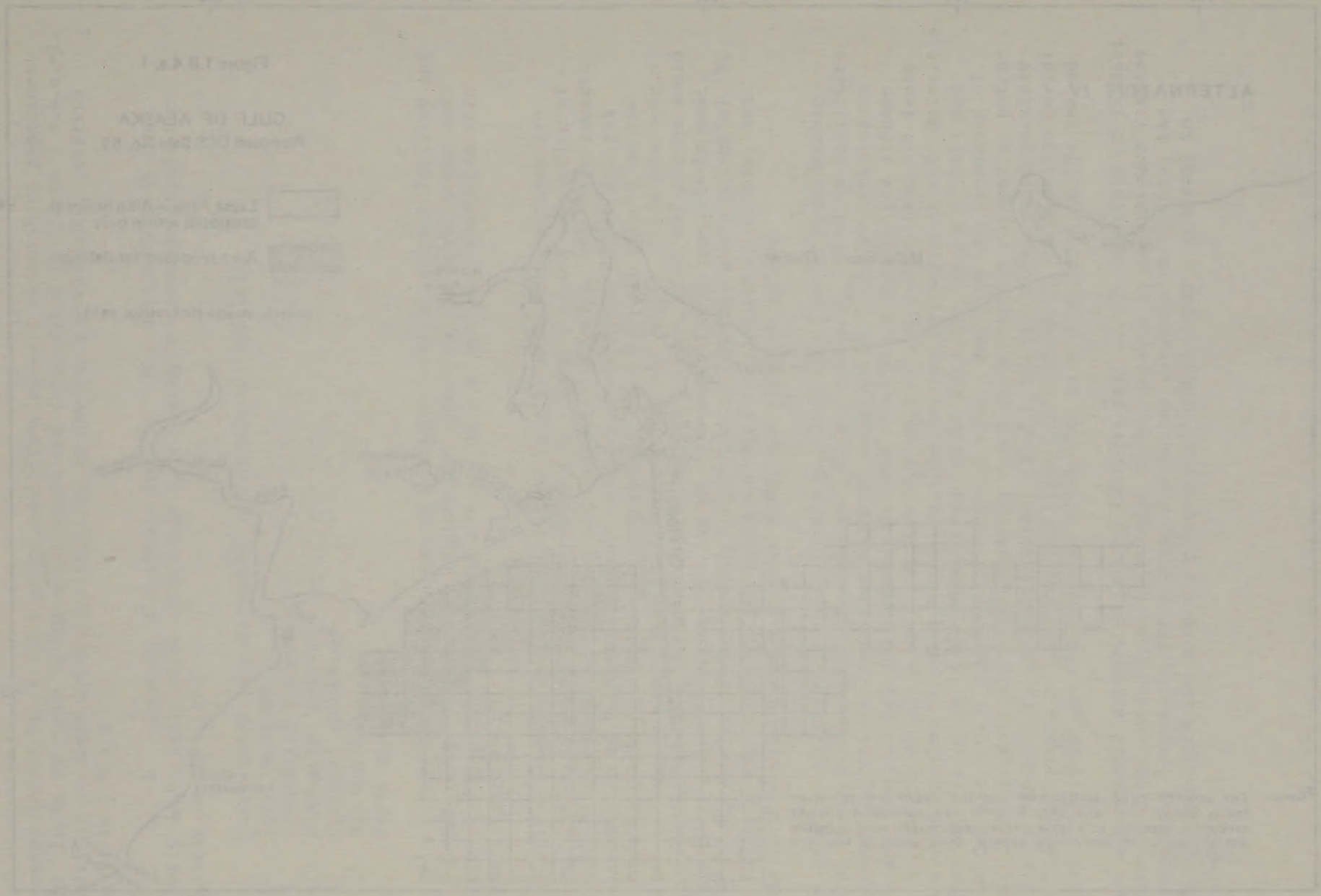
Under this alternative, the location of a tanker terminal support facility and potential LNG plant would mean a significant impact on the subsistence and commercial fishing lifestyle of Yakutat, unless the enclave assumption were adequately implemented.

The collective impacts on the lifestyle of Yakutat under this alternative would be similar to those described under the proposed action. Deletion of the nearshore tracts would probably not particularly reduce lifestyle impacts in the community of Yakutat. However, if an enclave style of oil and gas development onshore is adequately implemented, then overall impacts on the lifestyle of Yakutat would be significantly reduced. Also, if enclave development were implemented, local economic impacts on employment and income would probably be relatively minor. The impact of onshore facilities development, pipeline construction, oil terminal facilities at Yakutat, and a potential LNG plant on local land use patterns would probably be moderate to severe, and similar in nature to those discussed under the proposed action.

It has been recognized that man's historical past is often of considerable cultural importance to the lifestyle of a local community. Onshore facilities development potentially resulting under Alternative IV could possibly cause both significant direct and indirect adverse effects on terrestrial archaeological and historical sites. Such direct impacts may result from off-lease onshore construction activities and possible oil contamination of site materials. Indirect effects on cultural sites could result from the siting of oil- and gas-related facilities adjacent to cultural sites, and from the processes of salvage archaeology. Although unlikely, significant adverse effects on potential marine subsurface, presently unidentified, cultural sites could possibly occur from the siting of offshore facilities, siltation due to pipeline burial, dredging activities and other marine activities occurring on or in the seabed.

Because subsistence activities are an integral part of the lifestyle of Yakutat and because these subsistence activities depend heavily on subsistence fishing and commercial fishing in the coastal and marine environs of Yakutat, the following summarizes the more significant biological impacts relevant to subsistence.


ALTERNATIVE IV
Figure 1.B.4.a.-1
GULF OF ALASKA
Proposed OCS Sale No. 55
Lease Area – Alternative to proposed action only
Area proposed for deletion
Source: Alaska OCS Office, 1979.
142°
141°
140°
139°
138°
60°
59°
Icy Cape
Icy Bay
Malaspina Glacier
Pt. Manby
YAKUTAT BAY
Russell Fiord
Nunatak Fjord
Monti Bay
Pt. Riou
Yakutat
Sitkuk R.
Dangerous R.
Harlequin Lake
Alsek River
Dry Bay
Cape Fairweather
Lituya Bay
Prognosticated Oil Pipeline* or Gas
*Note: The prognosticated development facilities and/or transportation routes shown here serve only to show how development might proceed subsequent to a lease sale decision, exploration activities and subject to all appropriate Federal, State and local laws and regulations.



The area suggested for deletion under Alternative IV is the area of the present major fishing effort by Yakutat and other Alaskan based fishermen, such as from Pelican, Alaska. Impacts would be reduced on loss of fishing gear and fishing area, and because fish population impacts would be reduced, catches would be less effected.

The oilspill trajectory analysis shows that should this alternative be selected, the probability of impacts on crab, salmon, and some inshore bottomfish species would be reduced from 80-27 percent or less. The major bottomfishing (including halibut) area impacts would not be reduced by this alternative.

It is important to note that spawning and rearing areas receive the primary benefits from this alternative. This is important to maintaining fish populations because of larval and juvenile sensitivity to water soluble fractions of oil.

While there would remain some impacts from pipeline construction to shore and the possibility that pollutant events from the remaining proposed lease area would come to shore, these impacts would be minor both in magnitude and length of time of occurrence.

Alternative IV would probably greatly reduce adverse impacts on most of the fish species inhabiting the Yakutat area. Only groundfish species would retain the original severity of impact.

In addition to the effects of a major offshore oilspill on fisheries, there are also some potentially significant impacts on sea otters, whales, and other marine mammals.

An impact of major concern is the issue of effects on endangered species of whales. The specific endangered species of whales consists of: blue whale (Balaenoptera musculus), fin whale (Balaenoptera physalus), sei whale (Balaenoptera borealis), humpback whale (Megaptera novaeangliae), right whale (Eubalaena glacialis), gray whale (Eschrichtius robustus), and the sperm whale (Physeter catodon).

Earlier exploration in sale 39, future exploration, and development in Kodiak and Shelikof Strait, combined with sale 55, could exert additional stress on the individual endangered whales, or their habitat, to adversely effect the well being of these endangered species. TAPS tanker and commercial fishing activities also might contribute to cumulative effects. Additional boat and aircraft traffic may cause temporary or permaent displacement of certain endangered species. Such impacts may be most significantat passes and other restricted migration corridors used by cetaceans.

The deletion of nearshore tracts in Alternative IV could reduce the air and boat traffic disturbances of seal and sea lion pupping and hauling grounds along the nearshore areas south of Yakutat Bay, especially the important seal habitat areas in the Dangerous River Delta and Dry Bay. The chances of oil contamination of these habitat areas will potentially be reduced, and the chances of seal contact with oilspills should be lessened.

Alternative IV could reduce potential impacts on marine mammals by reducing traffic disturbances of important coastal seal and sea lion habitat in the proposed sale area, and probably reduce the chance of oil contamination of seals and sea lions, as well as important habitat in these areas.

Alternative IV would reduce the potential impacts on endangered cetaceans, especially those species and numbers that feed and migrate through the nearshore tract areas such as the gray whale. The chances of direct contact between oilspills and whales, and the contamination of food sources, could potentially be reduced to a certain extent.

5. Alternative V - Modify the Sale by Deletion of the Nearshore and Northwest Portion:

Rationale: The deletions offered under this alternative represent a balanced determination between a number of environmental concerns as described in the following and the compelling requirement for still offering for lease an area with some reasonable chances of discovery of potential hydrocarbon resources. These determinations reflect the results of the scoping, environmental assessment, and public review process which included among many inputs particular coordination with the Geological Survey and other resource agencies in order to provide a balanced environmental-hydrocarbon resource analysis.

To provide a buffer for major salmon rearing and spawning area; major sea mammal and sea bird rookeries.

Also for protection of cetacean migration routes near the coast. This protective buffer also encompasses the major inshore commercial and subsistence fishery areas which are germane to the maintenance of the fisheries lifestyle of Yakutat and their local economy which is based on it.

This buffering concept for protection of fisheries and mammal resources was developed during the scoping, environmental assessment, and public review process in coordination with other State and Federal resource agencies.

In addition, the deletion of these nearshore tracts would provide a protective degree of space from onshore National Monuments and the Tongass National Forest, not from a visual and wilderness protective resource perspective, but also the prevention of additional development activities from occurring in too close a proximity to these coastal wilderness resources.

These deletions also provide almost the complete elimination of potential commercial and subsistence fisheries activity conflicts with OCS related activities offshore.

In addition to the nearshore deletions, offshore deletions afford protection for the bulk of the halibut spawning area in the proposed lease area. It also protects some of the bottom fishery area.

Based on spill trajectory and drift studies carried out in this offshore area, deletion of these tracts will help prevent the incursion of spilled oil into Prince William Sound and other sensitive areas to the west.

This will further facilitate the maintenance of Alternative V. Tracts to be deleted are:

764	808	853	899
765	809	854	900
766	810	855	901
767	811	856	902
768	812	857	903
769	813	858	904
770	814	859	905
	815	860	906
	816	861	
	817	862	
947	992	1037	25
948	993	1038	26
949	994	1039	27
950	995	1040	28
951	996		
952			
704	784	793	881
661	785	794	882
662	786	795	883
663	787	796	884
664	788	797	885
665	789	874	
740	790	875	
741	791	876	
742	792	877	
743	749	878	
744	750	879	
748	751	880	
705	752	837	
706	753	838	
707	754	839	
708	755	840	
709	756	841	
710	829	919	
	830	920	
	831	921	
	832	922	
	833	923	
	834	924	
	835		
	836		

a. Description of Alternative: This alternative involves the leasing of 218 blocks in the eastern Gulf of Alaska directly south of Yakutat; 132 blocks less than the proposed action. The blocks deleted are those in the nearshore (northeast portion of proposal) and northwest areas. These blocks comprise an area of approximately 504,153 hectares (1,245,762 acres). They are located from approximately 26 - 88 kms (16 - 55 mi) offshore and in water depths of approximately 90 - 400 m (297 - 1320 ft). The blocks are summarized by water depth and distance to shore in Appendix C.

The estimated undiscovered recoverable resources are also assumed to be about the same as Alternative I.

Estimated Activity Resulting from Alternative V: The potential development scenario for this alternative is the same as those described under the proposal in Alternative I.

The assumed locations of all onshore facilities as well as offshore pipelines and the blocks included in the alternative are illustrated in figure I.B.5.a.-1. A summary of presumed activities required to develop the estimated mean reserves are on table I.B.1.a.-1.

b. Summary of Probable Impacts: For Alternative V, which consists of both a nearshore and offshore area of tract deletions, the more likely impacts are:

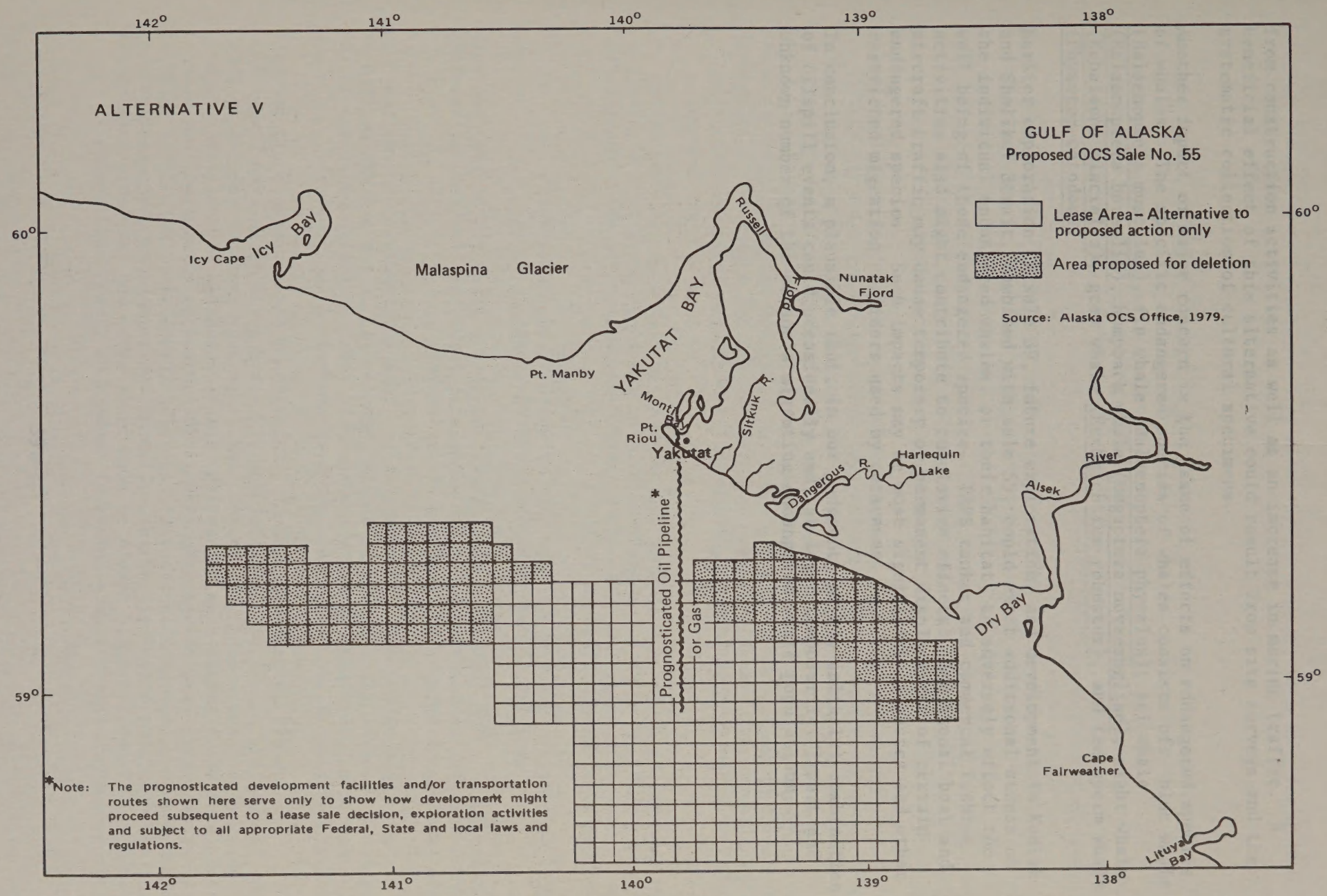
1. Maintenance of subsistence and community lifestyle
2. Local economy
3. Commercial fisheries
4. Endangered species
5. Cultural resources
6. Air quality
7. Water quality

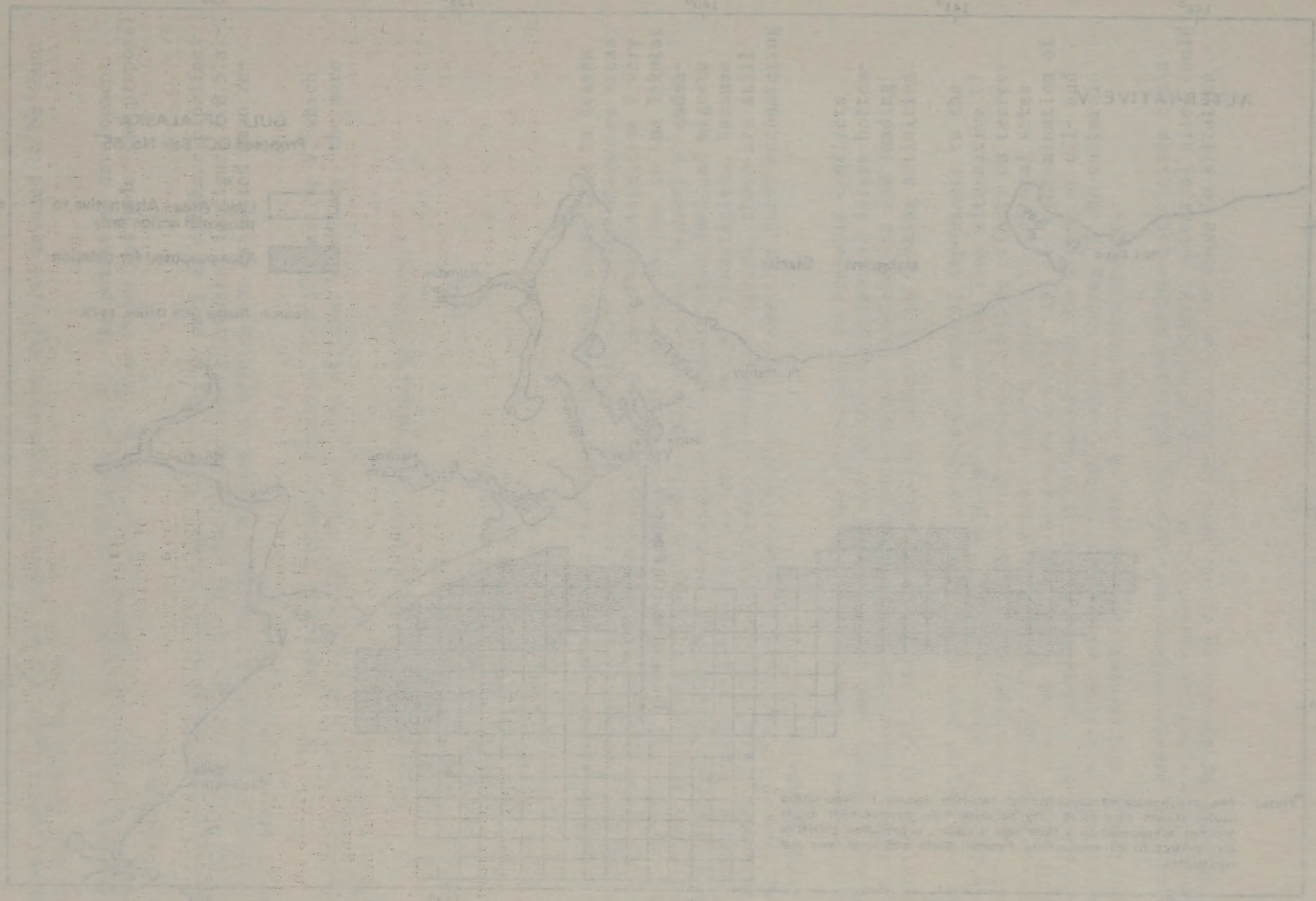
The tract deletions contained as part of Alternative V, would tend to lessen the degree of potential ecological impacts, especially in the nearshore areas. Results of the oilspill trajectory analysis have shown for Alternative V very small chances for an offshore oilspill to reach coastal beaches in the Yakutat to Icy Bay area. This alternative would reduce potential impacts on endangered cetaceans, especially those species and numbers that feed and migrate through the nearshore tracts such as the gray whale. Nevertheless, because development activities are concentrated in offshore regions, there are still some chances of impacting endangered whales in the event of their encountering a large oilspill.

There appears to be some potential for an increase in probable conflicts between offshore commercial fishing activities and potential future bottom-fishing activities with offshore marine terminal construction and loading operations, as well as effects of offshore oilspills on fishing activities.

Man's historical past is often of considerable cultural importance to the lifestyle of a local community. Development resulting from Alternative VI could cause both significant direct and indirect adverse effects on terrestrial, archaeologic and historic sites. Direct impacts to cultural sites could result from off-lease construction activities, and oil contamination of site materials. Indirect impacts could result from the siting of oil- and gas-related facilities adjacent to cultural sites, oiling of the cultural environment, and through the processes of salvage archaeology.

Significant adverse effects on potential submerged archaeologic sites could affect those which are unidentified. Although unlikely, potential sites could be affected by the siting of offshore facilities, an increase in siltation


ALTERNATIVE V
GULF OF ALASKA
Proposed OCS Sale No. 55
Lease Area– Alternative to proposed action only
Area proposed for deletion
Source: Alaska OCS Office, 1979.
142°
141°
140°
139°
138°
60°
59°
Icy Cape
Icy Bay
Malaspina Glacier
Pt. Manby
YAKUTAT BAY
Russell Fjord
Nunatak Fjord
Monti Bay
Pt. Riou
Yakutat
Sitkuk R.
Dangerous R.
Harlequin Lake
Alsek River
Dry Bay
Prognosticated Oil Pipeline*
or Gas
Cape Fairweather
Lituya Bay
*Note: The prognosticated development facilities and/or transportation routes shown here serve only to show how development might proceed subsequent to a lease sale decision, exploration activities and subject to all appropriate Federal, State and local laws and regulations.



from construction activities as well as an increase in marine traffic. A beneficial effect of this alternative could result from site surveys and the systematic collection of cultural specimens.

Another impact of major concern is the issue of effects on endangered species of whales. The specific endangered species of whales consists of: blue whale (Balaenoptera musculus), fin whale (Balaenoptera physalus), sei whale (Balaenoptera borealis), humpback whale (Megaptera novaeangliae), right whale (Eubalaena glacialis), gray whale (Eschrichtius robustus), and the sperm whale (Physeter catodon).

Earlier exploration in sale 39, future exploration, and development in Kodiak and Shelikof Strait, combined with sale 55, could exert additional stress on the individual endangered whales, or their habitat, to adversely effect the well being of these endangered species. TAPS tanker and commercal fishing activities also might contribute to cumulative effects. Additional boat and aircraft traffic may cause temporary or permanent displacement of certain endangered species. Such impacts may be most significant at passes and other restricted migration corridors used by cetaceans.

In conclusion, a plausible (but, in our judgment, highly unlikely) combination of oilspill events could occasionally and, at least temporarily, impact an unknown number of the season's migrating endangered whale populations.

6. Alternative VI - Modify the Sale by Deletion of Five Tracts Near Fairweather Grounds:

Rationale: The State of Alaska identified this portion of the proposed sale area as being particularly important for commercial fisheries and as a rearing area for king salmon stocks.

a. Description of the alternative: This alternative involves the deletion of five tracts in the extreme southeastern portion of the sale area. These five tracts, 55-319, 55-334, 55-348, 55-349, and 55-350 border the fishing area known as fairweather grounds. It is assumed that the deletion of these tracts causes virtually no change in the resource estimates nor the development scenario described for Alternative I, the proposal.

b. Summary of probable impacts: Deletion of these five tracts would have a very localized mitigating effect on fisheries and king salmon stocks. Adoption of this alternative would preclude some use conflict between oil and gas activities (structures, boat traffic) and commercial fisheries on these particular tracts. All potential impacts (discussed under Alternative I) from potential oil spills or discharge of muds or formation waters originating from these tracts would be eliminated. However, oil and gas activities on adjacent tracts, should they be leased, would have the potential for impacting these tracts.

In summary, although impacts from the proposal on fisheries and king salmon stocks in this area would probably be very minor, adoption of this alternative would virtually eliminate these minor impacts by eliminating any potential oil and gas activities on these tracts.

7. Alternative VII - Modify the Sale by Deletion of Three Tracts for Protection of Fisheries and Spawning Areas:

Rationale: The State of Alaska identified this portion of the proposed sale areas as being an important area for commercial fisheries, for halibut spawning and as tanner crab and Pacific Ocean Perch habitat.

a. Description of the Alternative: This alternative involves the deletion of three tracts, 55-217, 55-194, and 55-171, in the western portion of the sale area. Deletion of these tracts would cause virtually no change in the resource estimates and development scenario assumed in the proposal.

b. Summary of probable impacts: Deletion of these tracts would reduce the possibility of use conflicts between oil and gas activities and commercial fisheries on these tracts. Potential impacts on the important species in this area which might result from oil spills, or the discharge of drilling muds or formation waters originating from these tracts would be eliminated, but there would remain a potential for impacts resulting from similar activities on adjacent tracts, should they be leased. Although the impacts on these species and commercial fisheries would likely be very minor under the proposal, this alternative would further mitigate potential impacts on these three tracts.

8. Other potential tract deletion options. Prior to a final decision on the proposed sale, the Secretary has the option to delete any tract from the proposal, should it be determined that this is necessary to either avoid or further mitigate possible significant environmental impacts. Studies are currently underway which will determine which, if any, tracts contain geohazards that would necessitate the deletion of these tracts or imposition of special lease conditions. At the present time, it is impossible to specify which tracts, if any, might contain significant geohazards. However, this information will be available for interpreting on a tract-by-tract basis, and will be considered in the in the Secretarial Issue Document (SID) prior to the publication of a proposed Notice of Sale. (See section III.A.1.e. for a discussion of geohazards in the proposed sale area.)

Similarly, the BLM has initiated consultation with the NMFS pursuant to Section 7 of the ESA of 1973. Should this consultation, which will be completed prior to any sale decision, indicate that the proposal would jeopardize any of the endangered species in the area, the Secretary has the option to delete specific tracts or impose special conditions on any leases issued in order to eliminate those potential impacts. (See Sections II.B.6., III.A.2.a., III.A.5.a., and III.A.b.a. for a discussion s of the expected impacts on endangered species.)

C. Discussion of Comparative Analysis of Impacts and Alternatives: The following comparative analysis focuses on the varying degree of impact as a result of the proposed action and its alternatives for those issues identified in the scoping and environmental assessment process as being significantly impacted; i.e., maintenance of Yakutat's lifestyle, subsistence fishing and commercial fishing activities, marine mammals, migratory endangered whales, and visual and wilderness resource impacts of onshore facilities development.

A separate summary of impacts of the maximum development case is included in sec. III, Environmental Consequences.

The severity of socioeconomic impacts on Yakutat depend to a considerable degree on whether or not onshore facilities development is confined to an industrial enclave or compound. If onshore development is not separated from the community of Yakutat, then socioeconomic impacts to the maintenance of Yakutat's lifestyle could be quite severe.

The proposal, and Alternatives IV and V, assume both the oil terminal and potential LNG plant would be located in Yakutat. All alternatives contain the possible use of an offshore loading scenario as described under the proposal.

Regarding offshore impacts on biological resources, the USGS oilspill risk analysis suggests that there is a 31 percent chance of an offshore oilspill reaching the shoreline in 3 days under Alternative I. Alternatives IV and V, which offer nearshore tract deletions, reduce the probability of an offshore oilspill impacting the shoreline.

The essential issue considered among the various alternatives is: if socio-economic impacts on Yakutat are mitigated by shifting onshore development to offshore terminals, then risks to ecological and national monument coastal areas and offshore commercial fishing and marine biota could be increased by offshore loading in the proposed lease area. The offshore loading scenario could pose an unknown degree of risk to endangered whale species.

Of all the alternatives, only the no-action alternative completely eliminates any oil and gas development impacts on the subsistence lifestyle and commercial fishing activities of Yakutat.

The delay-of-sale alternative (III), and Alternative No. V both tend to minimize the degree of potential impact on the subsistence lifestyle of Yakutat. In the delay-of-sale alternative, it is assumed that Yakutat's local district coastal management program would be completed and Yakutat's capital improvements plan would be updated and completed by the end of whatever timeframe the sale was delayed. Other significant impacts of the proposed action would most likely be only delayed to some future timeframe.

Alternative V, which contains provisions for both nearshore and offshore tract deletions would tend to reduce the degree of impact on Yakutat's subsistence lifestyle, related onshore impacts, and also tend to reduce potential impacts on nearshore biological systems. Even the probability of an offshore oilspill impacting on the coastal beaches is significantly reduced under alternative V as results of the oilspill trajectory analysis has shown. The possible use of

an offshore loading facility and the attendant presence of oil tankers in the proposed lease area and probably some general increase in overall related oil and gas activities in or near the loading terminal could tend to increase the potential for vessel conflicts with offshore commercial fishing activities. Also, any chronic or acute oil spillage associated with either the loading facility or oil tankers could impact to some unquantifiable degree the fish eggs or larvae in surface waters, offshore marine mammals and migratory endangered whales. Effects of Alternative V on onshore visual and wilderness resources in close proximity to Yakutat would probably be significantly reduced.

Alternative IV is closest to the proposed action, except for the nearshore tracts proposed for deletion. Onshore oil terminal facilities, support and supply facilities and pipelines would be located at Yakutat. Thus, under Alternative IV, potential impacts on the commercial fishing and subsistence lifestyle of Yakutat could be significant and quite similar to impacts of Alternative I, except if an enclave style of development could be adequately implemented by the local government in Yakutat and private industry. The principal difference generated by the nearshore tract deletions under Alternative IV would be to lessen some of the potential impacts resulting from either chronic or acute oil spillage on nearshore fisheries and habitats upon which the subsistence fisheries heavily depend.

II. DESCRIPTION OF THE AFFECTED ENVIRONMENT

Portions of the following material describing the affected environment have been incorporated with the appropriate graphic in Volume 2, as indicated below.

A. Description of the Affected Environmental Conditions on Offshore Oil and Gas Operations

1. Environmental Geology: Refer to Graphic No. 1 in Volume 2.

2. Meteorological Conditions and Physical Oceanography: Refer to Graphic No. 2 in Volume 2.

B. Description of the Biological Characteristics of the Affected Environment

In an effort to improve the explanation of descriptive data shown on the color graphics, the descriptive text has also been included on the graphics. Therefore, very little text appears under certain topics here.

1. Marine Habitats and Food Web Resources: Refer to Graphic No. 3 in Volume 2.

2. Commercial and Sport Fish: Refer to Graphic No. 4, Major Fin and Shellfish Distribution, and Graphic No. 5, Commercial Fisheries, in Volume 2.

3. Marine and Coastal Birds: Refer to Graphic No. 6 in Volume 2.

4. Marine Mammals: Refer to Graphic No. 7 in Volume 2.

5. Terrestrial Mammals: The following section describes the land mammals in the proposed lease area.

a. Black Bear (Ursus americanus) and the Brown Bear (Ursus arctus): These bears occur along the coast of the proposed lease area particularly during the salmon runs in the summer and fall when fish are a major portion of their diet. The bears are also present in the spring when winter-killed deer are available as carrion.

Unique to the proposed lease area is the "blue" or "glacier" phase of the common black bear, the largest concentration of which is found in the Yakutat area (Alaska Dept. of Fish and Game, 1975).

b. Sitka Black-Tailed Deer (Odocoileus hemionus sitkensis): Sitka black-tailed deer utilize the coastal areas of the proposed lease area for winter range, particularly the eastern side of Yakutat Bay and Kantaack, Knight, and Dolgoil Islands. The deer depend on dense coastal timber with its

relatively snow-free understory for cover in winter, feeding on shrubs or venturing, under severe conditions, onto the beaches to feed on kelp and beach vegetation.

c. Moose (Alces alces): Moose occur throughout the coastal land of the proposed lease area with their winter range extending from Icy Bay to the Alsek River Delta.

d. Wolf (Canis lupis): Wolves range in the proposed lease area in association with moose and black-tailed deer populations, scavenging the beach and tidal areas year-round.

e. Coyote (Canis latrans): There is a substantial population inhabiting the mainland and islands of Yakutat Bay that frequent the beach and tidal areas. (Personal communication, Ron Ball, ADF&G, Yakutat.)

f. Furbearers, Such as Beaver (Castor canadenis), Mink (Mustela vision), and Land Otter (Lutra canadensis): These animals occur in the proposed lease area, especially along bays and river deltas. Red fox (Vulpes fulva) are found adjacent to the proposed lease area, and scavenge the beach and coastline. Wolverine (Gulo luscus) occur throughout the Yakutat area and may be increasing in numbers. Wolverine frequent the beach and tidal areas. (Personal communication, Ron Ball, ADF&G, Yakutat.)

6. Endangered and Threatened Species: Refer to Graphic No. 8 in Volume 2.

C. Description of Social and Economic Components of the Affected Environment

1. Lifestyle of Yakutat: The urban history of development-related activities throughout Alaska is largely capsulized in Anchorage. Population trends from 1950 to 1977 for the state, Anchorage, and Yakutat are portrayed in table II.C.1.-1. For a more complete discussion of regional population and economic trends, see Appendix D.

Yakutat is located on the southeast corner of Yakutat Bay on the northern edge of the Gulf of Alaska. Yakutat is separated from southcentral Alaska by the Malaspina Glacier; from the rest of southeast Alaska by the Glacier Bay National Monument; and from Canada by the St. Elias Range. The town faces Monti Bay, an arm of the much larger Yakutat Bay and the only natural deep-water harbor on the Gulf of Alaska between Cordova and Cape Spencer. Public transportation to and from Yakutat is possible only by air.

The original village of Yakutat was settled by a diverse group of Indian peoples who came to share a distinctive Tlingit culture, similar in many respects to Northwest Indian cultures from Alaska's Southeast to the shores of Northern California. Over time, the community has experienced the effects of early explorers, Russian fur-trading interests, severe epidemics, and most recently the quartering of several thousand American troops during World War II. OCS exploration during the recent past and changes associated with passage of the Alaska Native Claims Settlement Act have further reduced the isolation of the community, as has Yakutat's modern airport. The traditional culture of Yakutat, while altered by these contacts, still maintains its integrity and is highly valued by its Tlingit inhabitants, as well as by more recent white immigrants to the community.

Valued characteristics of Yakutat culture include family solidarity based on traditional matrilineal kinship relationships and behaviors, participation in traditional fishing, hunting, and gathering activities and utilization of local food sources, and festivities which maintain the social distinctions and relationships that are important to community residents. Maintenance of the Tlingit language, traditional arts and crafts, and good hunting and fishing opportunities are the three most important values listed by Yakutat residents in a survey conducted in 1975 (Alaska Consultants, Inc.). This survey also indicated that approximately half of the area residents are lifelong residents of Yakutat and the other half are immigrants. The lifelong residents tend to be Indian, and the immigrants tend to be Caucasian. Furthermore, the immigrants tend to come to Yakutat with more professional/technical/managerial skills than the Natives of the area. This tends to result in a certain polarization in the community between long-term residents and newcomers. Tension associated with this polarization seems to be strongest among recent immigrants.

Yakutat's 1977 areawide population of 565 (Table II.C.1.-1) is 74 percent Alaska Native, almost all of whom are Tlingit, according to a 1975 locally conducted census. The 1970 ratio of 52 males for every 48 females is slightly less than the state ratio of 54 males for every 46 females.

Table II.C.1.-1

Population Trends

Year	Alaska 1/	Anchorage 2/	Yakutat
		Number	
1950	131,000	30,060	298
1960	220,000	82,736	230
1970	302,400	126,333	190
1977	407,400	188,304	3/ 565
1978	403,000	191,871	3/ 567

1/ U.S. Bureau of the Census.

2/ Estimates from 1950-1970; Anchorage Urban Observatory, 1977.

3/ Areawide estimate, Alaska Consultants, Inc.

Yakutat has a mayor-council form of government, with 6 councilmen elected at large, and a city manager who conducts the day-to-day operations. As a first-class city not within an organized borough, Yakutat may levy property taxes of 30 mils (30 percent) without a referendum.

Yakutat is a first class city and school district. A new high school was built in 1973, and with the completion of a new grade school in the 1978-1979 school year, all Yakutat area children attend modern school facilities.

By rural Alaska standards, the people in the Yakutat area are well educated. About 86 percent have advanced beyond the 9th grade and 32 percent have completed at least 1 year of college. In addition, within the last 5 years, 28 percent have taken a training course designed to lead to employment.

One Alaska State Trooper is stationed in Yakutat with an office at the airport. There is a local magistrate, but there is no local police station nor jail facilities.

The firefighting force consists of 14 volunteers. Firefighting equipment consists of a 1,000-gallon-per-minute pumper with a 1,000 gallon tank, a truck with a 300-gallon-per-minute pump and a 230 gallon tank, and an ambulance. Additional equipment is available at the airport where the FAA has a 500-gallon-per-minute pump and the State Department of Transportation and Public Facilities maintains a crash truck. Water sources are hydrants and several streams and ponds.

Yakutat has a health clinic and an active alcoholism program. A state health nurse and Public Health Service doctors and dentists visit periodically. People requiring hospital care are flown to Juneau or Sitka.

Yakutat has a good water supply system and has plans to upgrade the system in fiscal year 1979 to include a few residents not currently on the system.

The sewer system serves most of the city residences. The city plans to extend the sewer lines to connect the few exceptions. The system provides for secondary treatment of sewage. Solid waste is collected weekly and buried in a sanitary landfill.

Electric power is diesel generated. The power system is a good one; however, the cost of electricity is approximately 3 times higher than in Anchorage because of the economics of scale and because diesel fuel is much more expensive than natural gas which is used by Anchorage.

Most residential units are on the telephone system, which is provided by the Southeast Alaska Telephone Company. Local high school students operate the local television station, and a church group has plans for a radio station in the near future.

Approximately 86 percent of Yakutat's housing is in fair to good condition, and about 7 percent of the housing is in very poor condition. All of Yakutat's 180 housing units (table II.C.1.-2) are at least seasonally occupied. The only vacant units in the Yakutat road-connected area in 1976 and 1977 were uninhabitable; ergo, the vacancy rate is zero. The household density rate of 3.1 persons per housing unit is fairly low.

Table II.C.1.-2
Housing Inventory
Yakutat Road-Connected Area

Type of Unit	Condition of Housing Unit: Good	Fair	Poor	Very Poor	Total Units
Single family	60	27	12	12	111
Multifamily	12	7	0	0	19
Trailers	23	13	1	0	37
Group housing	0	13	0	0	13
Total	95	60	13	12	180

Source: Alaska Consultants, Inc., Sept. 1978, Anchorage. City of Yakutat, Capital Improvements and Service Program.

Outdoor recreation includes skiing (in season), walking, picnicking, fishing, hunting, motorcycling, and snowmobiling. Indoor recreation includes swimming, basketball, dancing, volleyball, and movies.

Hunting, fishing, and trading form the traditional mainstay of people in the Yakutat area. Today, like many other southeast Alaskan communities, fishing and fish processing are the major sources of economic strength.

Salmon is the principal species caught and processed; although halibut and dungeness, tanner and king crab have been added in recent years. Exceptional freshwater and saltwater fishing and hunting opportunities, coupled with outstanding scenic attractions, form the basis of Yakutat's tourism and recreation industry.

The wood products industry is presently at a low level in Yakutat, although it offers a promise of being a major source of income and employment in the future. Most of the forest lands in the Yakutat area are within the Tongass National Forest, including some of the most valuable stands in southeast Alaska. The Yakutat village corporation, Yak-Tat-Kwaan, is a lesser but

significant owner of forest lands in the area since its selection of 23,040 acres to which it was entitled under the Alaska Native Claims Settlement Act. Using a rotation of 120 years, the local forests are capable of supporting an annual cut of about 69 million board feet of timber on a sustained yield basis.

Approximately 30 percent of the labor force in Yakutat is engaged in fisheries-related occupations. Another 25 percent is engaged in professional/technical/ managerial jobs. Forestry occupies about 18 percent of the jobs, and processing engages about 10 percent of the workforce. Other occupations include machine trades, construction, and miscellaneous jobs.

A survey conducted in Yakutat in 1975 addresses a number of cultural and lifestyle considerations important to community residents. Both Native and non-Native residents are concerned that key elements of the traditional culture of Yakutat be maintained.

The values most strongly favored by residents include the social and economic interactions of the small community, good hunting and fishing opportunities, and the beautiful natural surroundings. Because of the importance of these values, the community as a whole has a very conservative attitude towards development. Sentiments are divided equally between those who want no furthr industrial development and those who want limited and controlled development. Virtually none of the population favors large scale development.

Present social problems recognized by community residents include excessive drinking by approximately 25 percent of the population, racial tension between long-term Tlingit residents and newer, most often white immigrants, inadequate community facilities, a lack of social services, and emigration from the community.

Subsistence food gathering ranks as the third most valued sociocultural element, after preservation of Tlingit arts and crafts and the Tlingit language. Fishing is the most important subsistence activity, but hunting is also significant. Table II.C.1.-3 shows the amount of subsistence food values by households. From this table, it appears that approximately 24 percent of the Yakutat area food value is derived from subsistence food gathering.

The community attitude toward growth is almost evenly divided between those who want to see the community remain at its current size and those who want to see it grow to around 1,500. Virtually no sentiment exists favoring growth beyond 1,500. The reluctance of people to see a larger community is based on the belief that large-scale growth would deteriorate race relations, destroy traditional lifestyles, and increase competition for subsistence resources. Between 15 - 30 percent of the total economic value of food consumed by residents is derived from subsistence resources; therefore, a reduction of this resource would be a significant loss.

On the positive side, the residents see development as producing many desirable benefits. These include a practicing doctor, a practicing dentist, a hospital,

a swimming pool, a large general merchandise store, a community college, a beauty/barber shop, a hardware and building supply business, a drug store, a bank, a radio station, a television station, and a local newspaper. Most of these amenities are normally found in Alaskan communities with populations of 1,500 or more. Thus, despite the importance of these facilities to Yakutat, most would require substantial community growth before they could be realized.

The people of Yakutat appear to have some capacity locally to participate in the economic growth of this area. The median household income is more than $15,000 per year; 70 percent have savings accounts, 28 percent hold either stocks or bonds, 52 percent own commercial property or assets, and half have life insurance policies.

2. Local Economy of Yakutat: The following discussion is taken directly from BLM's Socioeconomic Studies Program documents created by Alaska Consultants, Inc. (For a full citation, see table II.C.2.a.-1).

Unlike many traditional Alaska Native communities, Yakutat's prospects for continued growth based on sound economic development appear good. Potential sources of this growth include fishing and fish processing, wood products, tourism, and renewed offshore oil and gas exploration and development.

Yakutat's current economy is based in fishing and fish processing. However, additional sources of economic strength are found in tourism, wood products, and in certain government activities, most notably those of the U.S. Coast Guard and the Federal Aviation Administration (FAA). Offshore oil and gas exploration activities also contributed to Yakutat's economy following the April 1976 lease sale, although the local impact of this industry is currently at a low level. All of these activities are called "basic" or external, as they are export industries whose fortunes are determined by forces outside the local area and are the foundation upon which "secondary" or internal industries--those whose fortunes are determined by local forces--rest. Thus, gains in basic industry are essential for long-term community growth.

a. Employment: When converted to average annual full-time employment, Yakutat had a total of 257 jobs in 1977 (see table II.C.2.-1). The largest single employment sector was government with a total of 82 full-time jobs. Of these, 40 were in local government, with the largest single employer in this area being the Yakutat School District.

The Federal Government had a total of 34 employees in Yakutat in 1977, of which 13 were Coast Guard personnel stationed at the nearby Ocean Cape Loran Station. The Federal Aviation Administration (FAA) had 10 employees, and other Federal agencies represented in the Yakutat road-connected area were the Weather Service, the Forest Service, and the Post Office. All told, 91 percent of the Federal employment in the Yakutat area was judged to be basic.

A total of 8 full-time state employees were counted in the Yakutat area in 1977, half of them performing highway maintenance functions for the Department of Transportation and Public Facilities. Another person from the same department

Table II.C.1.-3

Subsistence as a Percentage of Household Food Costs[1/]

Yakutat, Alaska, 1974

% Food Value From Subsistence	Yakutat Households
	---------%--------
None	10.0
A very small amount	34.0
25 percent	30.0
50 percent	16.0
75 percent	10.0
More than 75 percent	----
Total	100.0

1/ Based on a sample of 50 households in the city of Yakutat and its road-connected area.

Source: Alaska Consultants, Inc.

Table II.C.2.-1

Average Annual Full-Time Employment[1/]

Yakutat Road-Connected Area, 1977

Industry	Employment	
	Number	Percent
Agriculture, Forestry, and Fishing	38	14.80
Mining	8	3.1
Contract Construction	13	5.1
Manufacturing	32	12.4
Transportation, Communication, and Public Utilities	30	11.7
Trade	32	12.4
Finance, Insurance, and Real Estate	5	2.0
Service	17	6.6
Government		
Federal	34	13.2
State	8	3.1
Local	40	15.6
Total	257	100.0

1/ Includes self-employed and military personnel.

Source: See Appendix D, table D-3.

was associated with the airport, while the Division of Alaska State Troopers of the Department of Public Safety and the Alaska Department of Fish and Game were also represented. Only 2 persons, or 25 percent of total state employment in this area, were determined to be basic.

The second largest sector, in terms of average annual full-time employment in the Yakutat road-connected areas in 1977, was agriculture, forestry, and fishing, with all employees in this sector being fishermen. Although the government sector had more employees, all persons engaged in fishing were considered basic compared with only 40 percent of the government jobs. Thus, the agriculture, forestry, and fishing sector had the largest number of basic jobs of any employment sector in the community in 1977.

Two other employment sectors--manufacturing and trade--each averaged 32 employees in 1977. Yakutat's manufacturing sector included the fish processing operations of the Yakutat Cold Storage and Western Seafoods, plus some logging. (The 1977 operations of the Yakutat Cold Storage were interrupted by the May 1977 fire which destroyed most of the plant.) However, all employment in Yakutat's manufacturing sector can be considered basic since only a very minor share of the commercial fish catch is consumed locally, and essentially all timber cut in the Yakutat area in recent years has been barged out.

The largest employer in the trade sector in Yakutat in 1977 was the Yakutat Lodge, which had an annual average of 11 employees. None of the other businesses in this sector had more than 2 or 3 employees. Almost one-third of the jobs in this sector were considered basic on the grounds that they were derived either from tourist activities or from offshore oil and gas exploration operations.

Transportation, communication, and public utilities is a sector which was also well represented in Yakutat in 1977. A total of 30 jobs were counted in this sector, compared with 20 in 1976. Nine of the 20 jobs recorded in 1976 were considered basic, all of them associated with air taxi or airline operations and thus were tourist-related. The 10 additional jobs counted in 1978 were all basic, but were derived from helicopter and service base operations associated with oil and gas exploration activities in the northern Gulf of Alaska. (Service boat personnel were not counted as part of Yakutat's total employment).

Of the remaining employment sectors, services was the best represented in Yakutat in 1977, with an annual average of 17 jobs. However, all jobs in this sector were secondary, except for those associated with tourist-related hotel and boat charter operations. Contract construction averaged 13 employees, with almost half being judged to be basic. Eight persons were counted in mining, 6 more than in 1976, with all employees in this sector except those associated with a sand and gravel operation, being from oil companies active in the offshore exploration program then underway in the northern Gulf of Alaska. All of these people were considered to be basic employees.

Finally, the 5 people counted in the finance, insurance, and real estate sector included employees of a local bank and of the Yak-Tat-Kwaan, Inc. Employees of the Yak-Tat-Kwaan, Inc., were considered to be basic because,

like other corporations established under the terms of the Alaska Native Claims Settlement Act, its operations are primarily supported by government funds awarded in the settlement of Native claims rather than being dependent on monies circulating within the community.

Unemployment and Seasonality of Employment: Like most Alaskan areas with an economy heavily based in fishing and fish processing and supplemented by tourism, employment in this community can be expected to show a high degree of seasonal variation. Between 1970 and 1977, insured employment in the Yakutat/ Ocean Cape area increased 51 percent. No detailed analysis of trends in the various sectors is possible because of disclosure regulations. However, a major change did take place in the fishing and fish processing industry during this period.

In 1970, the old Ocean Cape Seafoods cannery went bankrupt and many people in the community were unemployed until the community-owned cold storage plant opened in 1971. A second processor, Western Seafoods, now leases space in the old cannery. These 2 plants added an element of stability to the community's fishing and fish processing industry which was previously lacking. However, the May 1977 cold storage plant fire is assumed to have had a depressing effect on processing jobs here as insured employment totals in 1977 were well below 1976 levels, despite the fact that 1977 was the most successful year for salmon fishing in the Yakutat area since statehood.

Another change which occurred in the Yakutat area in 1976 and 1977 and to a lesser extent also in 1978, but which was not necessarily reflected in insured employment data, was growth in employment relating to the servicing of offshore oil and gas drilling activities in the northern Gulf of Alaska. Except for a small number of people employed at the Yakutat service base, however, these oil and gas activities have now ceased.

In response to increased opportunities for employment and income in basic industry in Yakutat, the community's secondary sector also experienced growth since 1970, particularly in the trade and local government sectors. Furthermore, the finance, insurance, and real estate sector, which was not represented in Yakutat in 1970, now includes a branch of Behrends Bank and the Yak-Tat-Kwaan, Inc., office.

Occupational Skills: Data relating to occupational skills of adult residents in the Yakutat area was collected by Alaska Consultants, Inc., in March 1975 as part of a detailed socioeconomic survey conducted for the city of Yakutat. Each of the 50 persons interviewed was asked to list his or her job skills. Of the first listed skills, the most often cited were in clerical and sales occupations, followed by those in services, professional/technical/managerial and structural work, plus a fewer number in processing, machine trades, miscellaneous and farming, fisheries and forestry occupations (see table II.C.2.a.-1). Another 5 people claimed to have no occupational skills.

Fifty Yakutat households were surveyed by Alaska Consultants, Inc. In each household, the person interviewed was asked to total up all cash income received

Table II.C.2.a.-1
Job Skills-Yakutat Planning Area-1975 1/

Occupation	Male	Female	Total
	Number		
Professional, technical, managerial	3	3	6
Clerical and sales	1	11	12
Services	4	5	9
Farming, fishery, and forestry	3	0	3
Processing	0	3	3
Machine trades	3	0	3
Structural work	6	0	6
Miscellaneous	3	0	3
Not specified	3	2	5
Total	26	24	50

1/ First listed skills of 50 persons surveyed.

Sources: Alaska Consultants, Inc., March 1975. Socio-Economic Survey of the Yakutat Area. Anchorage.
See Appendix D, table D-3.

Table II.C.2.a.-2
General Assistance Payments 1/
Fiscal Year 1972-77

Fiscal Year	Cases	Total Payment	Average Payment	
			Monthly	Annual
	Number	Dollars		
1972	47	37,464	66	797
1973	45	28,468	53	633
1974	31	14,362	39	463
1975	15	7,525	42	502
1976	38	39,636	87	1,043
1977	28	26,543	79	948

1/ Payments made to individual cases by the Bureau of Indian Affairs.

Source: U.S. Department of the Interior, Bureau of Indian Affairs. Juneau.
See Appendix D, table D-3.

by the household in 1974, except for monies paid out under the terms of the Alaska Native Claims Settlement Act. From this survey, the mean household income in Yakutat and its road-connected area in 1974 was determined to be $15,900. In addition to convention income, 29 of the 50 households surveyed received Alaska Native Claims Settlement Act benefits, and all but 5 indicated that they supplemented their cash income through subsistence hunting, fishing, or other food gathering activities.

Despite Yakutat's increased prosperity, welfare in the form of general assistance payments made by the U.S. Bureau of Indian Affairs to Alaska Natives and public assistance funds distributed by the Alaska Department of Health and Social Services remain significant sources of income for some local residents (see table II.C.2.a.-2). The Bureau of Indian Affairs distributed a total of $26,543 among 28 individual "cases" in Yakutat during its fiscal year 1977.

b. Commercial Fishing Industry: The fishing and fish processing industry has been Yakutat's major economic activity since the turn of the century. Until May 13, 1977, there were 2 seafood processing plants in the community--Yakutat Cold Storage and Western Seafoods. The Yakutat Cold Storage was owned by the city of Yakutat and leased to the Yakutat Fishermen's Cooperative which froze salmon, halibut, and crab. However, except for the ice house and dock, this plant was destroyed by fire in May 1977. A second processor, Western Seafoods, is located in the old Ocean Cape cannery and normally processes salmon, dungeness crab, tanner crab, and minor amounts of halibut. Close to 25 persons were employed in fish processing on an average annual year-round basis in Yakutat in 1977, plus almost 40 in fishing, but not all of these people were local residents.

The Yakutat fisheries management area extends between Cape Suckling and Cape Fairweather. Yakutat is the only community within this fisheries area, but a large share of the fish harvested here is either not caught by locally based fishermen or is not processed at Yakutat, or both. Effort by Yakutat fishermen is almost exclusively centered around salmon with most shellfish and halibut taken by boats from outside the Yakutat area. However, a number of Yakutat residents (and the Community Enterprise Development Corporation) have a financial interest in a 42.7-m (140 ft) freezer vessel which is currently being leased to an operation engaged in hauling frozen fish products from Dutch Harbor and the Bering Sea to Seattle.

According to the Alaska Department of Fish and Game (1975), slightly more than half of the crab caught in the Yakutat fisheries area is usually processed at Yakutat, but little halibut is landed locally. There are more than 20 major salmon streams in the Yakutat area with about 10 supporting a commercial set gill net fishery on a regular basis. These are the Alsek, Akwe, East-Dohn, Italio, Situk, Lost, Yahtse, Kaliakh, and the Tsiu-Tsivat Rivers. Most efforts by local fishermen are concentrated on these river systems, as well as Manby Shore and inside Yakutat Bay. The Yakutat area also has a major offshore power troller salmon fishery, but most of these vessels land their catches elsewhere, primarily at Pelican, but sometimes as far away as Seattle.

The salmon fishery of the Yakutat area is unlike that of the remainder of southeast Alaska, both in species composition and in the gear used. Whereas the region as a whole is primarily a pink salmon fishery, the more valuable sockeye and coho form the basis of the Yakutat district catch. Pinks, chums, and chinook spawn in only a few streams in the area, although a pink salmon run to Humpy Creek on Yakutat Bay produces well in odd-numbered years, and a chinook salmon catch in the area comes from the Alsek River. Overall, the Situk River is the area's largest producer, followed by the Alsek and the East-Dohn Rivers.

Unlike the set gill net salmon fishery of the Yakutat area, the troll fishery is relatively new. There are two distinct troll fleets: one fishing the "inside" and the other fishing the "outside" waters. The inside troll fishery has developed during the past 10 years and is primarily a locally based hand troll fleet made up of skiffs and pleasure boats, most of which do not venture outside Yakutat Bay. By contrast, most of the power trollers are more than 24.4 m (80 ft) long with the smallest being in the 12.2-m to 15.2-m (40 to 50 ft) range.

The offshore troll fishery has grown in importance in southeast Alaska during the past 15 years as many of the earlier trolling grounds in the region became less productive and the larger boats began fishing the outside waters, first off Baranof and Chichagof Islands and, more recently, the Fairweather grounds north of Cape Spencer. According to the Alaska Department of Fish and Game (1975), as much as 75 percent of the total southeast Alaska troll catch now comes from these offshore areas, with about 30 percent of the total coming from the Fairweather grounds.

From 1973 to 1977, Yakutat fishermen caught 8,635,000 lbs of salmon, or a yearly average of 1,727,000 lbs (table II.C.2.b.-1). This amounted to a yearly value of $2,303,212 to the fishermen (based on average annual catches over the 5-year period of 86,200 lbs of chinook; 823,200 lbs of sockeye; 595,200 lbs of silvers; 157,800 lbs of pinks, and 64,600 lbs of chum). Figuring first wholesale value as roughly twice the value realized by fishermen, first wholesale value is approximately $4.6 million/year (see fig. II.C.2.b.-1).

The April 1977 fire, which destroyed the Yakutat cold storage plant, has brought some changes to the Yakutat salmon fishery. During the 1978 season, salmon was purchased by both the Yakutat Fishermen's Cooperative and Western Seafoods and also by 2 other buyers. Much of the fish bought by the cooperative was processed at the Western Seafoods plant, and most of the salmon purchased by the 2 local plants was frozen and flown out of the area. One other buyer flew salmon directly out of Yakutat while the fourth shipped his fish to Juneau.

The Yakutat cold storage plant was owned by the city of Yakutat and leased to private operators, currently the Yakutat Fishermen's Cooperative. The plant, however, was seriously underinsured. Efforts to obtain funding to rebuild the plant have thus far been unsuccessful, but the city will probably become actively involved in this effort in the near future and is hopeful that the cold storage plant can once again become operational.

Table II.C.2.b.-1

Value to Yakutat Fishermen

Species	1973	1974	1975	1976	1977
			Dollars		
Salmon	1,344,850	1,369,600	995,360	1,494,550	2,401,500
Halibut	2,597,800	1,965,400	2,390,720	2,933,840	1,960,440
Dungeness crab	2,005,914	1,122,447	713,380	408,771	352,771
Tanner crab	530,065	864,503	559,215	482,901	270,662
Total	6,478,628	5,321,950	4,658,675	5,320,062	4,985,373

Based on 1978 Prices

Chinook salmon----$1.19/lb.

Sockeye----------.95/lb.

Silver----------.91/lb.

Chum----------.59/lb.

Pink----------.36/lb.

Halibut----------1.24/lb.

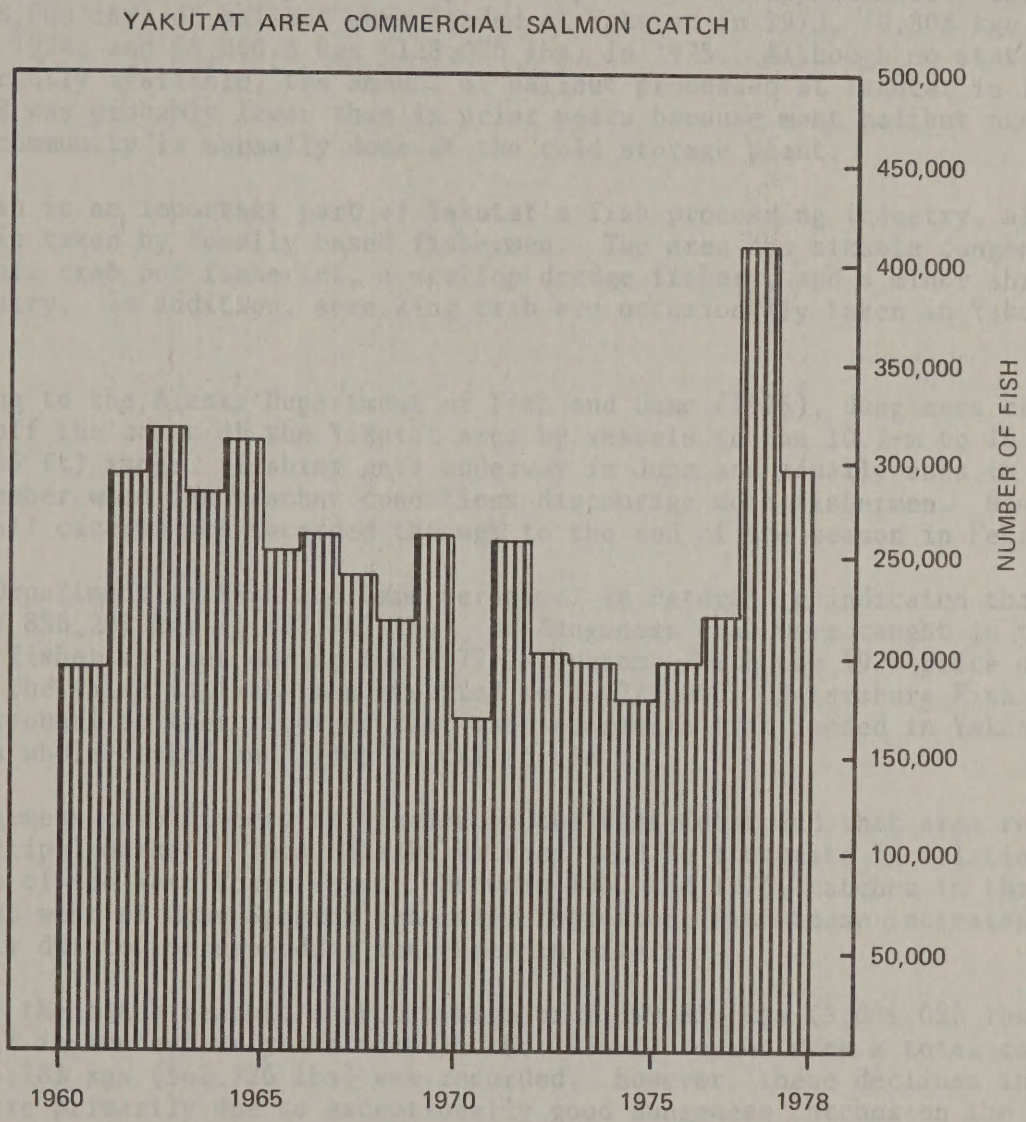
Tanner Crab---------.28/lb.

Dungeness Crab------.65/lb.

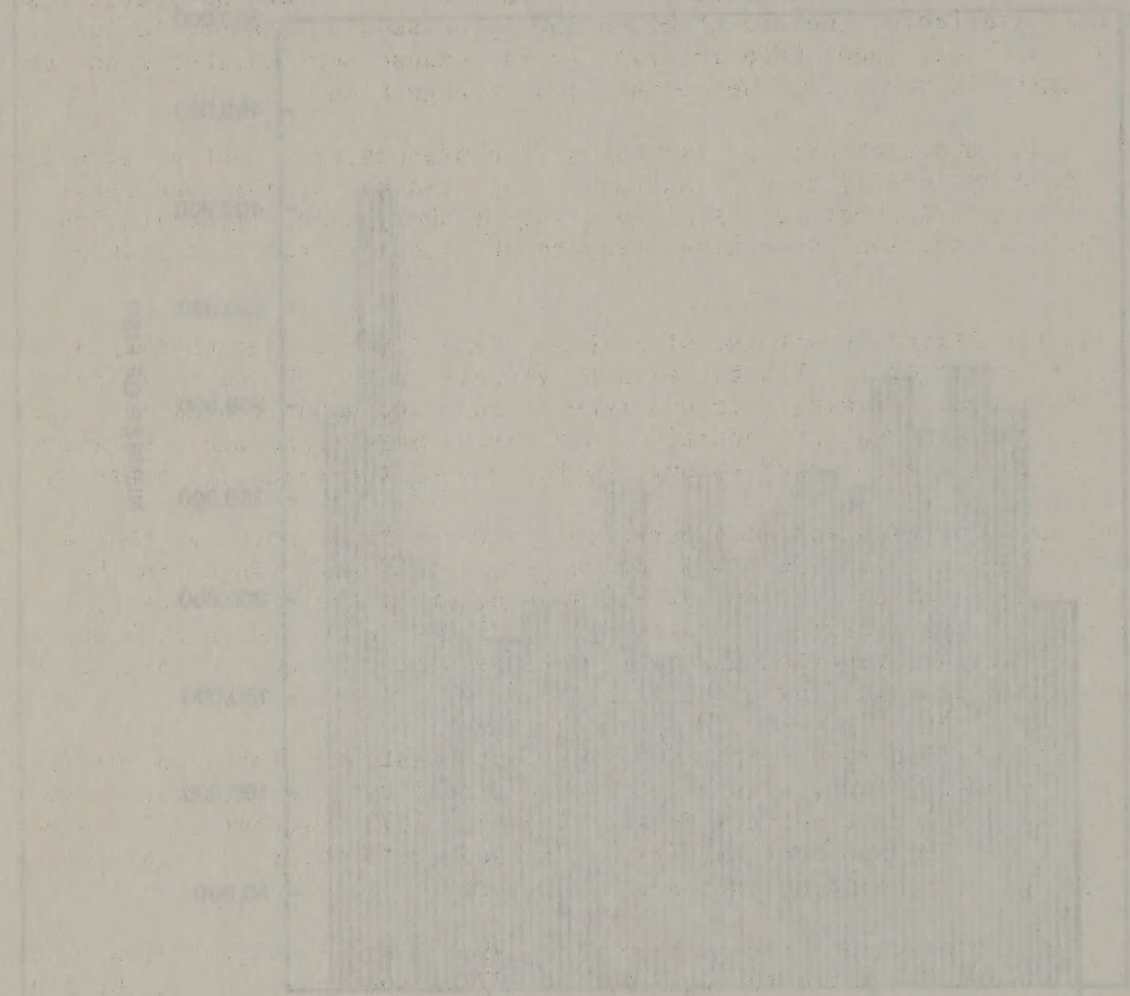
Source: Alaska Department of Fish and Game Records and International Pacific Halibut Commission Records.

See Appendix D, table D-3.

Figure II.C.2.b.-1



Source: Alaska Department of Fish and Game, 1975.
Alaska Department of Fish and Game, personal communication from Alaska Consultants, Inc.



During 1973-77, American and Canadian fishermen accounted for 9,555,000 lbs of halibut in Yakutat/Fairweather grounds. This amounted to an annual mean of about 2 million lbs or an average of $2-1/2 million in 1978 prices (table II.C.2.b.-1). Furthermore, there is and has been a sizable incidental halibut catch among the foreign trawling fleet (primarily Soviet and Japanese) in Yakutat/Fairweather grounds. Halibut, however, is a minor element in Yakutat's local fisheries industry, since this is an international fishery with catch levels and length of fishing season regulated by the International Pacific Halibut Commission.

According to information provided by local processors, approximately 103,420.8 kgs (228,000 lbs) of halibut were landed at Yakutat in 1973, 70,308 kgs (155,000 lbs) in 1974, and 58,060.8 kgs (128,000 lbs) in 1975. Although no statistics are currently available, the amount of halibut processed at Yakutat in 1977 and 1978 was probably lower than in prior years because most halibut processed in the community is normally done at the cold storage plant.

Shellfish is an important part of Yakutat's fish processing industry, although little is taken by locally based fishermen. The area has sizable dungeness and tanner crab pot fisheries, a scallop dredge fishery, and a minor shrimp pot fishery. In addition, some king crab are occasionally taken in Yakutat Bay.

According to the Alaska Department of Fish and Game (1975), dungeness crab are fished off the coast of the Yakutat area by vessels in the 10.7-m to 16.8-m (35 to 55 ft) range. Fishing gets underway in June and usually ends in August or September when bad weather conditions discourage most fishermen. However, some small catches are recorded through to the end of the season in February.

Alaska Department of Fish and Game personnel in Petersburg indicated that a total of 856,291 kgs (1,887,767 lbs) of dungeness crab were caught in the Yakutat fisheries area during the 1977-78 season. With the 1978 price up to 65¢/lb, the value to fishermen amounted to $1,227,000. Petersburg Fish and Game personnel further reported that most dungeness crab landed in Yakutat in 1978 was whole-cooked and flown to California.

The dungeness crab fishery originated on the West Coast and that area remains its principal market. Thus, Alaska catches tend to fluctuate in relation to the size of the West Coast catch. Between 1960 and 1973, catches in the area north and west of Cape Spencer generally increased, with these increases being primarily due to corresponding increases in effort.

In 1973, the catch reached a record high of 1,399,820 kgs (3,086,022 lbs), but then fell in successive years through the 1976-77 season when a total catch of only 246,181 kgs (542,726 lbs) was recorded. However, these declines in the catch were primarily due to exceptionally good dungeness catches on the West Coast rather than to any decline in the resource off Yakutat. The failure of the West Coast catch in 1978 (and thus, higher prices to Alaska fishermen) is likely to be reflected in increased landings in the Yakutat area, at least in the short term. The total catch for 1973-77 was 7,081,977 lbs, with an annual mean of 1,416,395 lbs. Average value at the higher 1978 price of 65¢/lb would be $920,000 (table II.C.2.b.-1).

Tanner crab is a very important but relatively new fishery in the Yakutat area. Except for 321 kgs (708 lbs) taken in 1968, commercial exploitation of this species did not get underway until 1972 when 7,028 kgs (15,493 lbs) was taken. The catch rose rapidly during the following 2 years, peaking at 1,400,495 kgs (3,087,512 lbs) in 1974.

Since 1974, catch levels for this species have fallen, with a total of 452,987 kgs (998,646 lbs) recorded for the 1977-78 season. However, at least part of this apparent decline is believed to be because of the imposition of a minimum legal size limit of 13.5 cms (5.3 in) for male tanner crabs in 1976. The total tanner catch for the 5-year period, 1973-77, was 9,669,096 lbs, or an annual mean of 1,933,819 lbs. This represents a value of over half a million dollars per year to fishermen (at the low 1978 price of 28¢/lb) (table II.C.2.b.-1).

The tanner crab fishery in the Yakutat area operates primarily in offshore water depths between 54.86 and 201.17 m (30 and 110 fathoms). Vessels are large, most of them in the 33.53-m (110 ft) class. The season opens at the beginning of September and extends through the middle of May, although bad weather often limits fishing effort during the winter months. Tanner crab has proven to be a very important addition to Yakutat's fishing and fish processing industry and has served to extend the fishing season through the winter months. The outlook for this fishery appears good and promises to continue to be of considerable importance to Yakutat's economic well-being.

According to Alaska Department of Fish and Game personnel in Petersburg, tanner crabs processed at Yakutat in 1978 were mostly whole-cooked and flown out of the area. However, some were taken in live tank vessels to Cordova for processing.

Limited stocks of red and brown king crab occur in Yakutat Bay. However, the only recorded commercial harvests here since 1970 took place in 1972 and during the 1974-75 and 1977-78 seasons when 2,042.6 kgs (4,503 lbs), 2,857.7 kgs (6,300 lbs) and 3,119 kgs (6,876 lbs), respectively, were taken. Little is known about king crab stocks in the Yakutat area, but their commercial potential is believed to be minor.

At least 5 species of shrimp are found in Yakutat Bay, but they have attracted little commercial interest. Periodic efforts by vessels using beam trawl gear and shrimp pots have not proven very successful, and it is assumed that most shrimp taken here in the future will continue to be for subsistence purposes.

Scallops have been commercially exploited in the Yakutat area only during the past 10 years. The only areas in the Gulf of Alaska which support significant numbers of weathervane scallops, in fact, are near Yakutat and Kodiak, with the latter being the most productive. According to the Alaska Department of Fish and Game (1975), major beds in the Yakutat area occur 32.2 to 64.4 kms (20 to 40 mi) offshore between Cape St. Elias and Cape Fairweather in depths ranging from 62.2 to 102.4 m (34 to 56 fathoms) or deeper. Vessels which engaged in this fishery were generally in the 27.4- to 30.5-m class, while dredges were usually 3.7 to 4.3 m (12 to 14 ft) wide. The scallops were

shucked on board ship and the meats washed, packed in 18.1-kgs (40 lbs) capacity cloth bags, and iced down in the hold. Almost all deliveries were made to Kodiak.

The first year for which commercial scallop catches were recorded in the Yakutat fisheries area was the most productive to date. In that year, 409,813 kgs (903,468 lbs) of shucked meat were caught. Catches remained high in 1969, but then fell off dramatically to 1,031 kgs (22,726 lbs) in 1970. Although catches then rose gradually through 1974, they have since fallen off again, with only 9,979 kgs (22,000 lbs) recorded in 1977. Scallops remain a fishery with a higher potential for exploitation under better market conditions and the successful introduction of mechanical shucking equipment. Recent industry projections point to an annual harvest of 800,000 lbs and an annual value of $2.4 million to fishermen (at the current price of $3/lb. for shucked meat) (personal communication, Pete Harris, New England Fish Company Development Manager).

According to the Alaska Department of Fish and Game (1975), other fish species are present in the Yakutat area, but relatively little is known about them. Immature herring are found on the east side of Yakutat Bay during the summer months and usually attract a large number of small king salmon feeders to the area. However, little information is available as to the economic potential of a herring fishery here. In addition, there are large razor clam populations in the Yakutat area, but they remain essentially unexploited except by a few local residents.

Bottomfish in the Yakutat area is a major resource, and is unexploited by U.S. fishermen. For the Yakutat grounds, the North Pacific Fisheries Management Council estimated in its Fisheries Management Plan and Environmental Impact Statement for the Gulf of Alaska Groundfish Fishery (1978), that the optimum annual yield of groundfish, including sablefish, was 41,400 metric tons. Broken down by species, this included 12,500 metric tons of pollock, 4,300 metric tons of cod, 6,400 metric tons of flounder, 7,900 metric tons of Pacific Ocean perch, 3,400 metric tons of rockfish, 3,400 metric tons of sablefish, and 3,500 metric tons of other groundfish species.

During 1969-74, Japanese trawl and longline fishing vessels accounted for 358,890,400 lbs of groundfish in shelf waters outside Yakutat/ Fairweather (long. 144:30 to 136°W) (see table II.C.2.b.-2).

Yearly averages were turbot and other flatfish, 1,806 metric tons; sablefish, 8,568 metric tons; Pacific Ocean perch, 13,814 metric tons; and Pacific cod, 149 metric tons; and in terms of 1979 world market prices, yearly values of $675,444, $3,204,432, $18,566,016, $387,838, $187,792, and $55,726, respectively, with an average yearly total of $23,075,248.

The combined figures for the Yakutat/Fairweather grounds accounted for a full 39 percent of all bottomfish taken by Japanese in the Gulf of Alaska over the 6-year period.

Sketchy Soviet records indicate that in the years 1973, 1974, and 1975, Russian vessels fishing on a limited basis in the eastern Gulf of Alaska (east of long. 147°W)--as compared with the major Soviet effort in the western Gulf and Bering Sea--took at least another 10,528 metric tons of bottomfish off Yakutat, including 7,083 metric tons of roundfish (Atka mackerel, Pacific cod, and sablefish); 2,629 metric tons of rockfish (including Pacific Ocean perch); and 59 metric tons of flatfish (including turbot and halibut). In terms of 1979 prices, this would amount to an additional yearly average of approximately $3.5 million.

Thus, in view of the Fishery Conservation and Management Act of 1976 (FCMA) imposing a 200-mile limit and projected phasing out of foreign fishing fleets, development of a bottomfish industry at Yakutat has been a subject of considerable local interest. Obviously, the area offshore from Yakutat has large bottomfish populations; however, this is a new fishery with many attendant unknowns, and it is generally considered more likely that a bottomfish industry would first have to be successfully established at Kodiak or further west before a town like Yakutat would be considered. Nevertheless, expansion into bottomfishing remains a long-term possibility at Yakutat.

c. Oil Exploration: The impact on Yakutat of exploratory offshore drilling activities was significant. This community was selected by Shell and ARCO (and originally also by Mobil) as the base for their offshore operations. A marine service base was constructed on the south side of Monti Bay during 1976 to serve 2 semi-submersible drilling rigs (the Sedco 706 and the Ocean Ranger) being used by these companies.

Yakutat was also a center for helicopter operations serving the various offshore rigs. At peak, about 30 people were employed on the marine service base at Yakutat, almost all of them local residents. As many as 20 people were associated with the operations of ERA Helicopters and Evergreen Helicopters of Alaska at the Yakutat airport at the height of offshore exploration activity. However, essentially all of these people were from outside the Yakutat area and did not live in the community.

A 161.9-hectare (400-acre) site on the south side of Monti Bay was leased from the Yak-Tat-Kwaan, Inc., by the Pacific Alaska LNG Company. This firm planned to eventually use only about 30 percent of the site for an LNG plant, if gas was discovered in commercially recoverable quantities offshore, and if it was a successful bidder for the gas. However, interest in the LNG project dwindled with the lack of success offshore.

d. Wood Products: Although the Yakutat area has timber resources capable of supporting a sizable wood products industry, development of these resources is currently at a very low level. Almost all commercial timber in the Yakutat area is within the Tongass National Forest, with comparatively minor (although commercially significant) amounts being in state ownership or having been selected by the Yak-Tat-Kwaan, Inc., the Yakutat village corporation established under the terms of the Alaska Native Claims Settlement Act. Sitka spruce accounts for about 64 percent of the total commercial forest land area,

Table II.C.2.b.-2
Total Japanese Trawl and Longline Catch[1/]
By Species or Species Group and Region, 1969-74

Region	Turbot	Other Flatfish	Sablefish	Pacific Cod	Pollock	Pac. Ocean Perch	Other Rockfish		Misc. Fishes	Total
					Metric Tons					
Fairweather	1383	2853	31185	156	1573	31649	3198	2053	74050	18
Yakutat	2764	3735	20222	740	4649	51232	3205	2435	89082	21
Prince William	959	682	10242	1276	2592	14211	781	799	31541	8
Kenai	3208	1954	17139	1397	9986	33836	1197	1491	70208	17
Kodiak	1779	1008	10882	2043	21237	19705	622	1042	58318	14
Shelikof	0	0	12	0	0	0	0	2	14	0
Chirikof	3162	1768	10706	1843	12721	28559	359	1038	60156	14
Shumagin	645	455	5457	521	2426	4128	129	485	14246	3
Sanak	228	483	7000	735	7234	5051	152	501	21384	5
TOTAL	14227	12938	112845	8711	62418	188371	9643	9846	418999	100
Percent	3	3	27	2	15	45	2	2	100	

1/ Round weight.

Source: Ronholt, Shippen & Brown, Vol.1, Aug. 1978

with hardwoods taking up about 30 percent, and western hemlock, mountain hemlock, and hemlock/spruce stands representing the balance in near equal proportions. Although young growth sawtimber and immature stands make up about two-thirds of the area's commercial forest land, around 76 percent of the total net board foot volume is in old growth stands. By species, about 80 percent of the commercial timber volume here is Sitka spruce, 16 percent is hemlock, and 4 percent is black cottonwood.

To date, only a minor amount of the commercial timber in the Yakutat area has been logged. A major factor in the slow pace of timber exploitation in the Yakutat area in recent years was the inclusion of most national forest timber in the area in a long-term sale to the St. Regis Paper Company of New York. The sale was held in December 1965. An annual allowable cut of 50,000,000 board feet from the old Yakutat Working Circle was included in this long-term sale which, using 1961 Forest Service figures for accessible commercial forest lands, theoretically left an annual allowable cut of 19,000,000 board feet for smaller independent sales. This long-term sale was later awarded to U.S. Champion-International and has since lapsed altogether, but it effectively tied up most timber in the Yakutat area for a 10-year period.

The Forest Service's subsequent moratorium on independent timber sales in this area until village land selections were completed under the terms of the Alaska Native Claims Settlement Act, further depressed activity in the local wood products industry. More recently, uncertainties as to the future ownership of lands in the Yakutat area have continued to discourage the sale of timber from Forest Service lands.

Under the terms of the Alaska Native Claims Settlement Act, the Yak-Tat-Kwaan, Inc., was entitled to select 9324.2 hectares (23,040 acres) of land in the immediate vicinity of Yakutat. According to figures supplied by the Kwaan, the lands selected include 7863.2 hectares (19,430 acres) of commercial forest with a total timber volume of approximately 521.4 million board feet. These timber lands are planned to be managed on a sustained yield basis, with most to be clear-cut except on the Phipps Peninsula.

Despite the problems and uncertainties presently facing the wood products industry in the Yakutat area, significant growth in this industry is nevertheless highly probable during the next 20 years. Like the fishing and fish processing industry, the wood products industry is labor intensive and this industry thus promises to make a positive contribution to future employment and population growth in the Yakutat area.

e. Tourism and Recreation: Yakutat, which has daily jet service each way to Anchorage and Juneau, is the most accessible of all the traditional Tlingit communities with the possible exceptions of Saxman and Klukwan. Although Yakutat receives a number of tourists, most arrive to take advantage of the area's exceptional hunting and fishing opportunities, rather than because of the town's Tlingit heritage.

Although hunting and fishing remain the Yakutat area's primary attractions for tourists, the spectacular scenery of this area also attracts other groups.

There are approximately 20 peaks of over 3350 m (11,000 ft) in the nearby St. Elias and Fairweather Ranges, which attract experienced mountain climbers each year. In addition, the Forest Service maintains about 32 kms (20 mi) of hiking trails in the Yakutat area, although most are not accessible by road. The area also attracts its share of photography buffs and beachcombers.

The impact on Yakutat's economy from tourism is primarily felt through the use of guide services, air charter and boat rental operations, and lodge facilities, plus some purchasing of goods and services within the community. Visitors stay at 1 of 2 lodges in the road-connected area, or at one of the various Forest Service cabins within the larger area. Use of the Yakutat area by sportsmen drops significantly following the closure of the area for moose hunting. While limited moose hunting is now allowed, only a modest growth in tourism associated with hunting and fishing opportunities in this area is anticipated in the future.

f. Military: The Ocean Cape Loran Station is located on the Gulf of Alaska coast near the mouth of Ophir Creek, a short distance by road from Yakutat. This U.S. Coast Guard facility has a long-range radio aid to navigation function and is manned by 13 personnel who live in group quarters at the site.

Military-related activities normally have low multiplier factors in terms of their ability to support secondary employment. The closure of the station is expected, therefore, to have only a very minor negative impact on Yakutat's economy.

g. Yakutat City Finance: A review of the full value of property within Yakutat's corporate limits as determined by the State Assessor (Alaska Taxable) from 1969 through 1977 (see table II.C.2.g.-1) was undertaken. According to the State Assessor's records, the full value of property in Yakutat increased a very substantial 1,067.9 percent between 1969 and 1977, with the greatest share of this increase taking place between 1976 and 1977. The latter increase was due primarily to the construction of a marine service base on the south side of Monti Bay during 1976, with the value of this property being reflected in the $3,886.61 of oil and gas-related property determined by the State Assessor to be within Yakutat's corporate limits in 1977. Thus, oil and gas property in Yakutat accounted for slightly more than one-third of the value of all property in the community in 1977.

An analysis of sources of general government revenues received by the city of Yakutat between 1971/72 and 1977/78 (see table II.C.2.g.-2) again indicated that a fundamental change has taken place in this community, essentially all of it between 1976/77 and 1977/78. In earlier years, Yakutat was heavily dependent on intergovernmental and other non-local sources of revenue because the community's tax base was insufficient to support all of its community services. While intergovernmental revenues remain important, the construction of a marine service base on the south side of Monti Bay added a major new taxpayer to the local tax rolls and was the primary reason for a per capita rise in property tax revenues from $79 to $286 between 1976/77 and 1977/78. A similarly dramatic gain was also recorded in per capita sales tax revenues

Table II.C.2.g.-1
City of Yakutat
Comparison of Full Value Determination

Year	Full Value Determination [1]
	Thousand dollars
1969	869
1970	870
1971	890
1972	890
1973	949
1974	1,020
1975	1,884
1976	2,562
1977	10,149

1/ Rounded to nearest thousand.

Sources: Alaska Department of Community and Regional Affairs, Division of Local Government Assistance. Alaska Taxable: Municipal Property Assessments and Equalized Full Value Determinations (Annual Report) Juneau.
See Appendix D, table D-3.

Table II.C.2.g.-2
Total and Per Capita Expenditures and Revenues, by Fiscal Year
City of Yakutat

Item	1973-74		1974-75		1975-76		1976-77		1977-78	
	Total	Per Capita	Total	Per Capita	Total	Per Capita	Total	Per Capita	Total	Per Capita
	Thous. dols.	Dols.	Thous. dols.	Dols.	Thous. dols.	Dols.	Thous. dols.	Dols.	Thous. dols.	Dols.
Expenditures:										
Operating[1/]	57	251	117	333	190	545	184	416	272	672
Capital Outlay										
Total Capital Investment	4,348	19,154	4,834	13,890	4,962	14,258				
Revenues:										
Property Tax	5	22	9	25	14	40	35	79	116	286
Sales Tax[2/]	11	48	13	37	17	49	23	52	85	210
Intergovernmental Revenue[3/]	43	189	77	219	115	330	109	246	94	232
Other	27	119	8	35	16	46	17	38	65	160
Grand Total	86		107		162		184		360	
Per Capita Total		378		305		466		416		889
						Number				
Population	227		351		348		442		405	

1/ School transfers not included.

2/ Assumes that loss of sales tax to establishments outside the corporate limits and that purchases within the city by outside residents are offsetting.

3/ Excludes General Assistance Program, Bureau of Indian Affairs. Includes Health and Education Fund, Alcoholism Program, Federal Revenue Sharing, Oil Impact Program, and Public Safety Building Grant.

Sources: Alaska Consultants, Inc. City of Yakutat Capital Improvements and Services Program. Anchorage, Sept. 1978.

See Appendix D, table D-3.

from $52 to $210 during the same period and for the same reason. As a result, locally generated revenues accounted for over half of Yakutat's general government revenues in 1977/78, whereas they had accounted for under 20 percent in 1971/72.

Although general government revenues are now supported primarily by locally generated funds, this is not the case with the Yakutat School District. According to figures supplied by the Alaska Department of Education (see table II.C.2.g.-3), less than 2 percent of the operating revenues for this school district in 1975/76 and 1976/77 was derived from local sources.

A look at city expenditures during the 1971/72 to 1977/78 period indicates that operating expenditures rose 325 percent from a very modest $64,000 to $272,000. Despite substantial increases in population during this period, per capita expenditures doubled--from $336 to $672.

A review of Yakutat's overall financial condition indicates that while this community has had to rely heavily on government grant and loan programs to provide the range of municipal facilities and services, it is in the enviable position of having incurred no long-term debt (see table II.C.2.g.-4).

3. Cultural Resources: Refer to Graphic No. 9 in Volume 2.

4. Visual Resources: The onshore region adjacent to the proposed sale area is entirely within the Pacific border range physiographic province. This province extends from Kodiak Island around the Gulf of Alaska to the southeast boundaries of the state. The Pacific border range province is an area of dense forests, heavy precipitation rates, upland glaciation, and extremes in topographic relief. The province is geologically young and has been glaciated numerous times.

The visual environment is the combination of various physical components, both natural and man-made. These components consist of topographic relief, vegetative cover, water patterns, marine/terrestrial edges, and various man-made, man-caused features such as structures and roads.

The onshore region adjacent to the proposed sale area can be divided into 2 physiographic subprovinces: the Gulf of Alaska coastal plain and the St. Elias mountain province. The topography of the eastern Gulf of Alaska coastal plain is typical of the landscape which has been recently glaciated. The contour profile of the plain is characterized by a gently rolling relief which averages around 61 m (200 ft). Area water drainage patterns are poor and swamp-like conditions are common. Other landscape features commonly found in the eastern coastal province are glacial outwash plains, beaches, sand bars, ice scoured lake basins, and fiords. Additionally, the massive Malaspina Glacier, the largest piedmont glacier in the world, lies just to the north of Yakutat. The Malaspina extends 45 km (27 mi) from the St. Elias Mountains to the sea. It is 72 km (45 mi) across and occupies most of the land space between Icy Bay and Yakutat Bay.

The second physiographic subregion, the St. Elias mountain range, is an area characterized by sharp relief and extensive glaciation. Individual massifs

within this province reach 4300-5800 m (14,000-15,000 ft). The massifs are surrounded by mountain clusters of 2430-4300 m (8,000-14,000 ft) in elevation. Except for the peaks and spines of the St. Elias system, the province is almost entirely overlain by ice and snow.

Vegetation within the Pacific border range province that fringes the sale area can be divided into 4 community types: alpine tundra, muskeg, grass-sedge meadow, and true forest.

The majority of the vegetation is found in the nearshore area of the coastal plain along the true forest (western hemlock-Sitka spruce system) and/or the grass-sedge meadow regime. The western hemlock-Sitka spruce system is a northern latitude equivalent of a tropical rain forest. Forest density is high. The floor is overgrown with shrubs and young conifers, the ground is covered with moss, and lichens hang from many trees.

Extensive grass-sedge meadows are found in the Yakutat Forelands. The forelands are a low glacial outwash plain crossed by numerous willow-lined stream channels.

The muskeg community in general exists at higher elevations interspersed throughout the forest in areas of poor drainage. Usually the muskeg is underlain by a thick peat bog. Typical plants dominant within the area are mosses, herbs, and sedges. However, scattered trees such as lodgepole pine do occur within the system.

The alpine tundra community in general lies above 2,500-3,000 ft. It occupies a position above the coastal forest and is usually separated by a transition zone. Low mat-like vegetation covers much of the area. Soils within this system are gravely, although some organic material may form in depressions. Since snowpacks and wind abrasion are considerable within the area, plants have evolved stunted growth patterns. Beyond this system is barren ground and the permanent ice fields of the St. Elias mountain region.

Water patterns within the area of study are strongly influenced by glacial activity. The Yakutat Forelands are the site of significant fluvial action. Numerous rivers, highly charged with silt, cross the forelands. Upon reaching the gulf, the rivers drain into tidal lagoons. The Alsek River, largest in the area, arises in British Columbia, flows through the St. Elias Range, and empties into the gulf. The Alsek River, as it passes through the forelands, assumes a braided pattern and has carved a wide, flat-bottomed channel.

In spite of the abundance of rivers, drainage within the area is poor. Much of the extra water is absorbed into such structures as marshes, bogs, and bog lakes. Deep water lakes are not common. One of the few, Harlequin Lake, occupies an ice scoured basin.

The transition zone between the marine and terrestrial environments in the Yakutat area is characterized by a variety of topographic features. The shore area is fronted by glaciers, lagoons, fiords, forests, meadows, and barely submerged sand bars.

Table II.C.2.g.-3
Operating Revenue Sources
Yakutat School System, by Fiscal Year

Source	1975-76		1976-77	
	Percent	Dollars	Percent	Dollars
Local	1.7	8,624	1.9	10,762
State	97.3	492,093	97.0	550,410
Federal	1.0	5,189	---	---
Other	---	---	1.1	6,080
Total	---	505,906		567,252

Sources: Alaska Department of Education. Education in Alaska 1976-1977, Report to the People, Juneau, 1977.
See Appendix D, table D-3.

Table II.C.2.g.-4
Indicators of Financial Condition [1/]
City of Yakutat, 1977

Item	Value
	Number
Population [2/]	442
	Dollars
Full Value Determination	10,149,240
Full Value Per Capita	22,963
General Obligation Debt	-0-
Total Debt [3/]	-0-
Per Capita Debt	
General Obligation	-0-
Total	-0-
	Percent
Debt as Percent of Full Value	
General Obligation	0.00
Total	0.00
	Dollars
Guidelines for Per Capita Debt	
Direct	618.48
Overall	733.93
	Percent
Percent of Full Value [4/]	5.50

1/ All fiscal data for Yakutat current as of 7/1/77.

2/ Population estimate as of 7/1/77 accepted by the Alaska Department of Community and Regional Affairs for municipal revenue sharing purposes.

3/ Total debt excludes $554,000 in Revenue Bonds outstanding as of 1/7/77.

4/ Median value for selected places of under 10,000 population used by Moody's Investors Services, Inc.

Sources: Alaska Department of Community and Regional Affairs, Division of Local Government Assistance. Alaska Taxable: Municipal Property Assessments and Equalized Full Value Determinations. Juneau. (Annual Report).

Coopers & Lybrand, Oct. 5, 1977. City of Yakutat, Alaska: Report on Examination of Financial Statements and Supplemental Data for the Years Ended June 30, 1977 and 1976. Anchorage.

Alaska Consultants, Inc. September 1978. City of Yakutat Capital Improvements and Services Program. Anchorage.

See Appendix D, table D-3.

Indications of man's presence along the eastern Gulf of Alaska are largely limited to the immediate coast. Settlements are sparse and industrial constructions are neither large nor complex. For a more detailed description of the man-made environment, refer to sec. II.C.7. Natural visual components are portrayed in fig. II.C.4.-1 and -2.

Visual patterns are strongly influenced by available light. In more arid climates, available light would be almost entirely dependent on solar variations. However, the city of Yakutat receives a yearly average precipitation of 132 in. The overcast accompanying such moisture, plus Alaska's high seasonal variations in available light, would limit both viewing time and distance. For further information, consult table II.C.4.-1.

5. Recreation and Tourism: The Yakutat area receives a substantial amount of recreational use; however, the coastal regions from Pt. Manby on Yakutat Bay west to Cape Suckling, and from Dry Bay southeast to Cape Spencer, receive little recreational use due to their relative inaccessibility. Yakutat does receive some tourism, but most people come to fish and hunt.

The dominant recreational activity of the Yakutat area is sport fishing. Yakutat offers some of the best stream sport fishing in southeast Alaska. Table II.C.5.-1 indicates locations and numbers of the prime sport fish varieties caught in the Yakutat area for the period of 1974 through 1978. In addition to the principal sport fish listed in table II.C.5.-1, Dolly Varden, northern pike, rainbow trout, and grayling are also caught by Yakutat sport fishermen.

In 1975, due to falling salmon numbers and increased fishing activities, the Alaska Department of Fish and Game (ADF&G) outlawed the catching of salmon by snagging. From 1975 though 1978 the salmon catch limit was fixed at 2 per day and 2 in possession. Referring to table II.C.5.-1, the higher harvest figures for red and king salmon represent 1974 data, while the lower figures are representative of recent catches. In 1979, ADF&G plans to raise the salmon limit to 4 per day and/or 4 in possession (personal communication with Alex Brogle, ADF&G, Yakutat).

The site of the greatest harvest of sport fish, the Situk River, is also a commercial fishing area which provides 70 percent of the local village income (personal communication with Alex Brogle, ADF&G, Yakutat).

Hunting is the second major recreational use of the Yakutat area. Chief game species are moose, goat, and bear; most hunted of these species are moose. Previous to 1974, there was unrestricted hunting of moose in the Yakutat area. A record kill of 324 was recorded in 1969; however, by 1974, the local herds were so depleted that a complete moratorium on moose hunting was declared. The prohibition continued in effect through the 1977 season. In 1978, a brief special hunt with a limit of 25 animals was initiated. In 1979 the limit was raised to 35. In the Yakutat area, 25 kills will be allowed with an additional 10 kills allowed in the Nunatak fiord area.

The moose herds across Yakutat Bay which inhabit the fringes of the Malaspina Glacier have been less affected by hunting. However, in 1974, permit hunting was instituted for the Malaspina herds. A season limit of 25 antlered animals has been placed on hunters for this herd (personal communication with Ron Ball, ADF&G, Yakutat).

ADF&G officials believe that the populations of the Yakutat moose herds will increase, and that limits should gradually rise with proper management.

In the Yakutat area, mountain goats can be hunted without permit. The goats inhabit remote places of limited accessibility and have thus remained the least hunted of the local game species. Because of these factors, goat populations have remained stable. The species is being closely monitored and there is a possibility that certain herds may be restricted by regulation if hunting pressures increase.

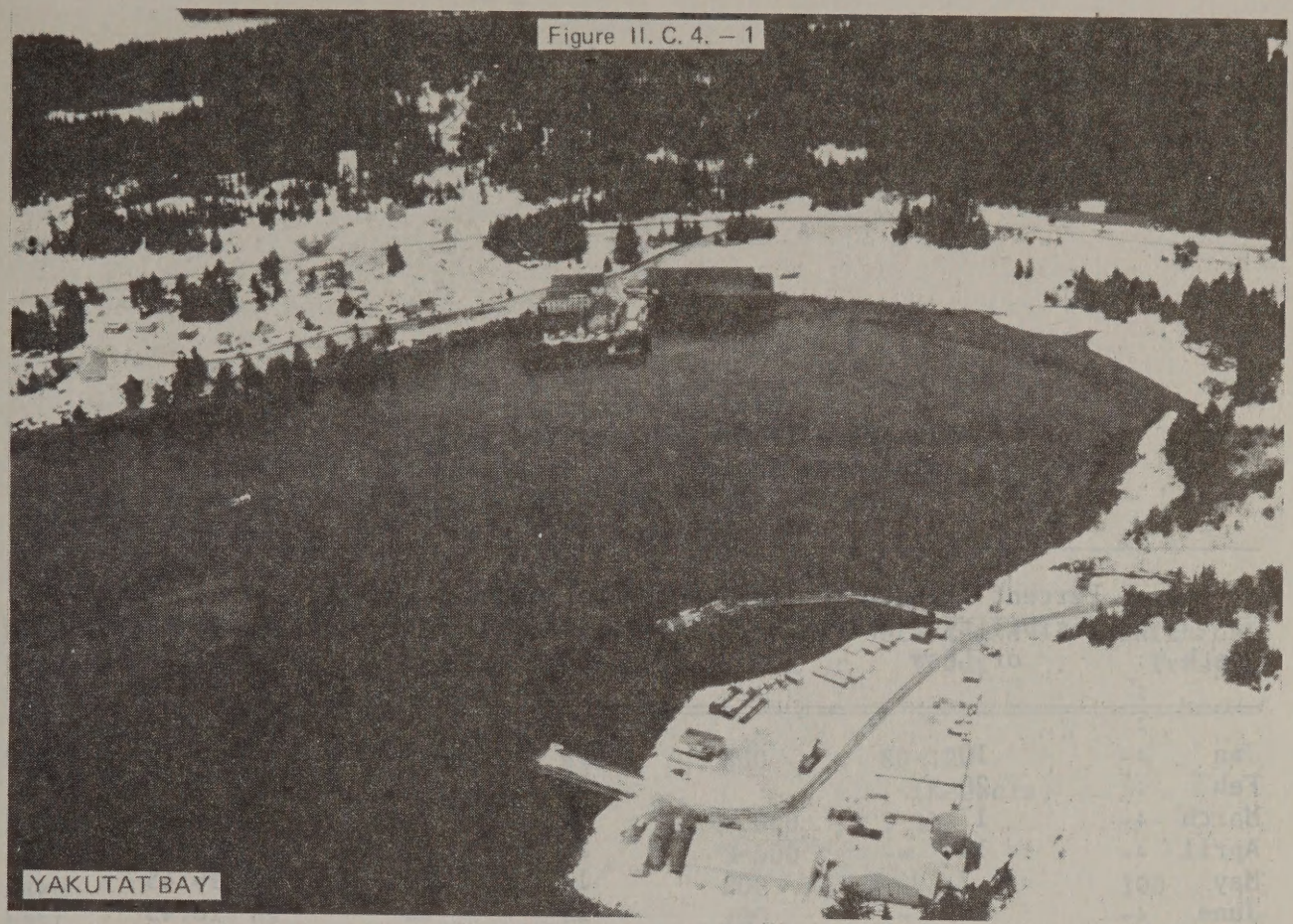
The Yakutat area is the home of substantial numbers of brown and black bears. Both species are highly sought after trophies and have been under increasing sport hunting pressure. Based on general observations and sightings, the brown bear population on the Yakutat Forelands appears to have declined in recent years. Although no accurate population estimates are available at this time, this possible decline is under study and attempts are being made to assess the status of the population through surveys and on analysis of harvest datum. Any future changes in the brown bear management plan will be based on these findings (personal communication with Ron Ball, ADF&G, Yakutat).

The Yakutat area has much to offer the occasional camper or tourist. Besides excellent fishing and hunting opportunities, the area is blessed with spectacular scenery--high rugged mountains, wide sandy beaches, fast flowing rivers, extensive forests, and glacier fed lakes of pristine quality. This fortunate combination of nature has enabled the Yakutat area to be used for such diverse activities as surfing, glacier skiing, mountain climbing, boating, and beachcombing. The Alsek River is enjoying increasing popularity as a white water expedition river. During the 1979 season, some 300 individuals participated in Alsek River expeditions. There are currently 13 commercial operators seeking permits for trips down the Alsek River.

The recreation infrastructure of Yakutat has recently expanded to meet the seasonal needs of the area. Guide services are now available to incoming fishermen and hunters. Air taxi services, including float planes, also are available in Yakutat. Float plane service is a recent addition to the area's transport system and will serve as a valuable aid to sportsmen. A float plane will enable sportsmen to reach remote areas where difficult terrain has defied landings by conventional aircraft.

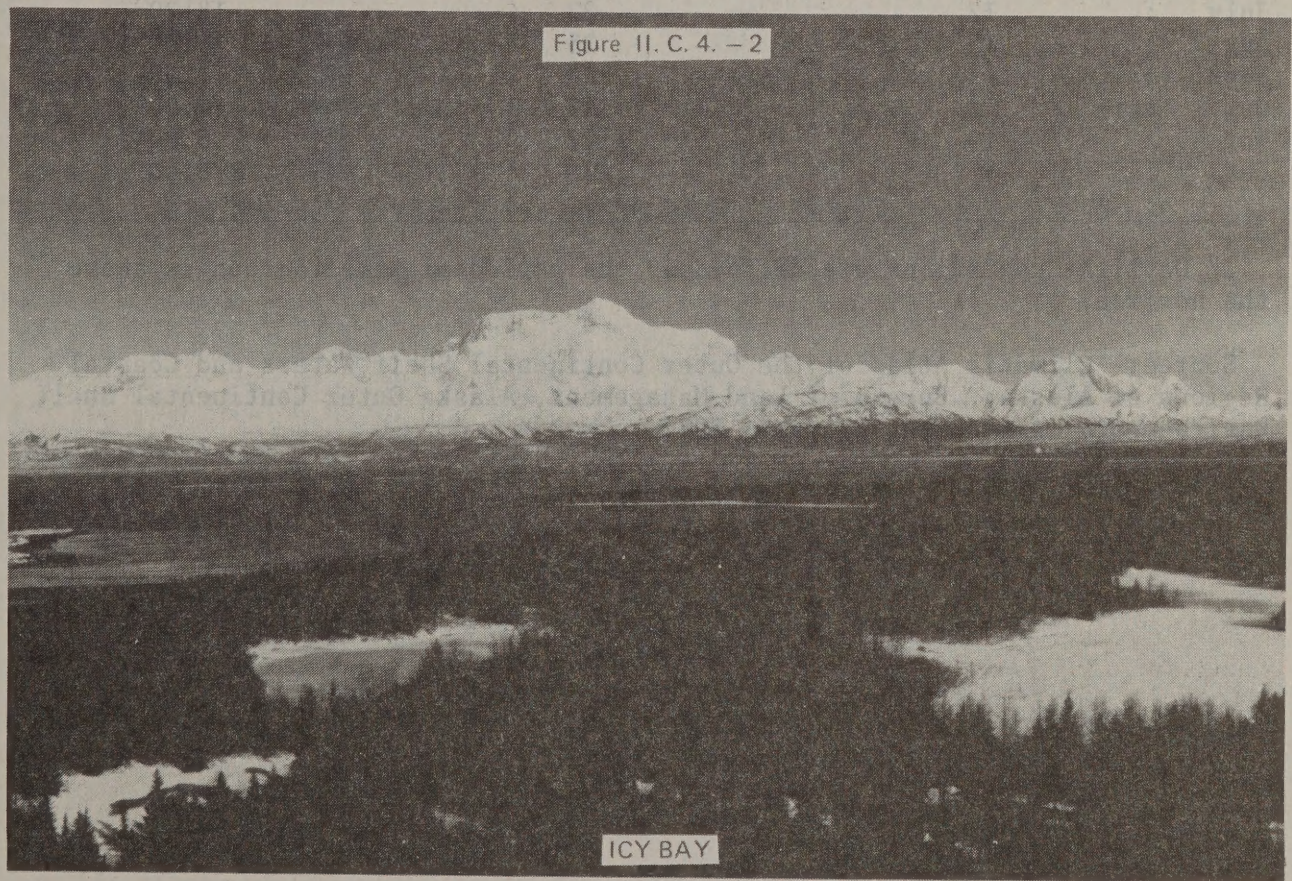
Commercial public accommodations in the city of Yakutat are limited. The average summer visitor would probably be forced to camp out if he or she wished to stay for an extended period. Camping sites are present, but not abundant. The U.S. Forest Service provides some sites along the beaches

Figure II. C. 4. – 1



YAKUTAT BAY

Figure II. C. 4. – 2



ICY BAY

Table II.C.4.-1
Factors Affecting Viewer Visibility
Along the Eastern Gulf of Alaska

Month	Percent Frequency Visibility 2 Miles or Less	Percent Frequency Visibility 5 Miles or Less	Average Hours of Daylight[1/]
Jan	10	20	6:45
Feb	20	32	8:30
March	17	30	11:00
April	10	20	14:30
May	7	12	16:45
June	8	15	18:45
July	12	23	18:20
Aug	15	25	16:00
Sept	11	22	13:30
Oct	8	19	10:00
Nov	10	22	8:00
Dec	15	28	6:00

1/ Daylight conditions are defined as the period of time the sun is above the horizon.

Source: Climatic Atlas of the Outer Continental Shelf Waters and Coastal Regions of Alaska: Bureau of Land Management, Alaska Outer Continental Shelf Environmental Assessment Program, 1977.

Table II.C.5.-1

Yakutat Sport Fish Catch
Five Year Average
1974-1978

Rivers and Lagoons	King Salmon	Red Salmon	Pink Salmon	Coho Salmon	Steelhead Trout	Cutthroat Trout
Situk	150-250	1500-7,000	150	800	80-120 (Keepers)	--
Lost	--	--	--	1,000	5-10	--
Italio	--	50	--	3-500	--	--
Akwe	10	--	--	200	--	100
East	30	--	--	200	--	--
Alsek	--	--	--	20	--	--
Ankau Lagoon	--	--	--	300	--	--
Tsiu	--	--	--	200	--	--

Source: Alex Brogel, Wildlife Biologist, ADF&G, Yakutat Office, 1979.

adjacent to the town. There are, however, 11 U.S. Forest Service recreation cabins near Yakutat.

In the past, use of recreational facilities in the Yakutat area has been dependent on the level of hunting and fishing activities. In 1979, Forest Service cabins received 4,454 visitor use days, which is a reduction from a 1970 high of 8,972 (see table II.C.5.-2). The reduction in cabin use closely reflects the decline in the harvest of local fish and game. When the local species populations have increased to the point that game quotas can be raised (especially for moose), it is assumed that recreational use will increase back to 1970 levels.

6. Wilderness Resources: Wilderness resources consist primarily of those land areas which man has neither developed in any way nor used significantly, except perhaps in a subsistence fashion.

Two large areas of wilderness have been formally recognized in terms of the Tongass National Forest and extensions to the Glacier Bay National Monument (see Graphics Nos. 9 and 10). These areas lie to the south of Yakutat and due east and south of the proposed lease area. In addition, the Wrangell-St. Elias National Park and Preserve constitutes a vast region of wilderness adjacent to Icy Bay, and is therefore susceptible to at least some visual impact from potential development on Native lands along the shores of Icy Bay.

There is also a wilderness study area designated by the Department of the Interior for lands immediately to the east of Yakutat and south along the coast.

7. Land Status and Land Use: Refer to Graphic No. 10 in Volume 2.

8. Transportation Systems: In light of recent, final Federal regulations by the Council on Environmental Quality on the composition of environmental impact statements, results of the scoping process for the draft EIS for proposed Sale 55, and after due description and consideration in the environmental assessment process, it has been determined that the overall degree of impact on the transportation systems is relatively minor, and therefore, both the description and impact discussion have not been included in this draft EIS for proposed Sale 55.

D. Coastal Zone Management:

1. State Coastal Management Programs: The Alaska Coastal Management Program (ACMP) was initiated in 1974 in response to the opportunity for coastal planning provided by the Federal Coastal Zone Management Act of 1972. The ACMP was established in state statute upon the passage of the Alaska Coastal Management Act (ACMA) of 1977. The ACMA created the Alaska Coastal Policy Council, required that local governments in the coastal zone plan for coastal resources within their jurisdictions, and set up a mechanism to allow coastal planning in the unorganized borough under certain circumstances (State of Alaska and the U.S. Dept. of Commerce, 1979). The U.S. Department of Commerce approved the ACMP on July 9, 1979.

The policy council has adopted guidelines and standards for the use of coastal resources. These guidelines and standards are the regulatory portion of the ACMP, and must be used as the guidance by local governments in fulfilling their planning responsibilities. When local plans are approved by the council and the legislature, they will become part of the ACMP. In the meantime, the guidelines and standards are serving to guide the decisions of state agencies for their activities in the coastal zone.

The coastal zone from Kayak Island to Cape Fairweather extends seaward to the 3-mile limit of the territorial sea. The inland boundary varies between 310-465 m (1,000-1,500 ft), depending in most cases on the inland extent of forestation (Alaska Dept. of Fish and Game, 1977). The inland boundary is subject to change when local and regional coastal plans are developed, but with the exception of Yakutat, it will be some time before a coastal plan is developed for the region.

2. Section 307(e) Consistency Review: Federal regulations (15 CFR Part 930) allow the State of Alaska to review Federal licenses and permits, the granting of Federal financial aid, and the conduct of other Federally sponsored activities in the coastal management zone for consistency with the policies and provisions of the ACMP.

3. Yakutat District Coastal Management Program: The city of Yakutat is developing a District Coastal Management Program (CMP) under provisions of the ACMA and Federally approved ACMP. The city submitted a draft of its program in December 1979. The city has requested a 12-month extension from a program approval date of December 4, 1979, mandated by the Alaska Coastal Policy Council. It is expected that this request will be approved and that the District Plan will be completed and submitted to the Alaska Coastal Policy Council for approval in the spring of 1980.

The boundaries of the proposed Yakutat CMP fall along the city's corporate limits. However, Yakutat intends to develop a program for a study area which extends the length of the coast from Cape St. Elias to the north to Dry Bay on the southern extemity, a distance of some 320 statute miles. If such an enlarged boundary area for a CMP is approved by the Coastal Policy Council, the city of Yakutat would not maintain jurisdiction over its implementation. Instead, State of Alaska authorities would be applied to implement the proposed subregional plan.

Table II.C.5.-2

Forest Service Recreation Cabin Use Trends
Yakutat Area

	1970	1971	1972	1973	1974	1975	1976	1977
Individual Visitors	830	209	647	N/A	557	686	626	672
Total Visitor Days	8,972	8,186	7,130	5,141	3,999	4,306	4,526	4,454

Source: U.S. Forest Service, Yakutat Work Center

N/A : Not Available

Considerable planning has occurred in the Yakutat area prior to its current District CMP effort. Yakutat has been funded by a U.S. EDA Title IX study which evaluated the process of OCS infrastructure impacts, and estimated a capital improvements program necessary to accomplish them (Alaska Consultants, 1978). Additionally, a comprehensive plan was proposed for Yakutat which anticipated OCS development in the Gulf of Alaska (Alaska Consultants, 1976). Most recently, the state conducted a demonstrative planning study for OCS development in the Gulf of Alaska area which included a discussion of onshore facility siting requirements for Yakutat (Alaska Department of Community and Regional Affairs, 1978). However, the city officials feel that there are several gaps in the present plans with regard to adequate policy statements and analyses of onshore development scenarios.

E. Water Quality: In the proposed lease area, 2 possible sources for water pollution exist: the communities of Yakutat and Cordova.

1. Yakutat: Yakutat has a good water system with a plentiful source and adequate storage facilities. In general, scattered enclaves in the area have their own water supply. In 1979, the City Capitol Improvements intends to connect the marine service base to the city water system. The city water service can be expanded to meet projected demands arising from oil and gas development.

A sewer system was developed by the Public Health Service in 1972 and upgraded in 1977. The system gives secondary treatment to nonindustrial waste. In the winter, when water taps are left running to avoid frozen pipes, the system can become overloaded. However, it is adequate for normal usage and overloading can be overcome without expanding the present facilities.

The seafood processing plant does not use the city sewage system. The marine service base and the airport maintain their own sewage treatment facilities. The FAA maintains a sewage lagoon. In the event of additional petroleum development, the city plans to upgrade the present facilities.

2. Cordova: Cordova has experienced water problems. The municipal water is chlorinated, but unfiltered. There is inadequate service to the industrial park where the 2 largest fish processing plants are located. In 1979, the city planned to upgrade services to the industrial park. Additional demands on the water system would prove the city water facilities inadequate. The New England cannery complex and the airport have their own water supply.

A sewage treatment plant was completed in 1975 and designed to treat non-industrial wastes. An extension to the industrial park and Whiskey Ridge subdivision was scheduled for 1979. Several scattered developments, including the New England cannery complex, the Morpac/Alaska Packers, and the ferry terminal, are not, nor scheduled to be, included in the city facilities. All major fish processors maintain large bunkhouse operations, and human waste is either discharged into septic tanks or directly into Orca Inlet. Cordova has a separate storm sewer system that serves most of the developed areas within the central city.

F. Air Quality: In order to estimate the air quality impacts of exploration, development, and production activities in the area proposed for leasing, emission data from representative offshore exploratory vessels and production platforms operating in OCS areas off Alaska were analyzed.

Emissions from Odeco, Inc.'s Ocean Bounty exploratory vessel operating in the Gulf of Alaska and the lower Cook Inlet (Phillips Petroleum, 1978) were analyzed to obtain an estimated of emissions associated with exploratory drilling.

Emissions associated with production were estimated using data from production platform Baker in upper Cook Inlet near Kenai. Table II.F.1.-1 shows the amount of emissions of the five year criteria pollutants, in grams per second (gr/sec) and tons per year (tons/yr), emitted from all sources on the exploratory vessel and production platform.

Table II.F.1.-1 summarizes the onshore air quality concentrations which would result from the exploratory drilling vessel and the production platform if located a distance of approximately 5 miles from shore. Several assumptions, which are explained in the footnotes, have been made in arriving at the estimates presented in the table. It should be noted that the assumption of a 5-mile distance from the offshore platform to a receptor air monitoring point on the coastline is conservative.

Other emission sources associated with offshore OCS operations are geophysical survey vessels and supply vessels servicing the offshore operations. Air emissions from these sources consist of exhaust combustion from engines and are considered insignificant (EPA, 1977; Battelle Pacific Northwest Laboratory, 1979).

Interior's efforts to regulate OCS air emissions are discussed in section I. EPA does not have authority under the Clean Air Act to regulate air emissions on the OCS (Exxon Corp. v. EPA, No. 78-1932, Ninth Circuit, August 20, 1979). Accordingly, Interior's authority to regulate OCS air emissions associated with oil and gas development is exclusive.

The actual emission data used to prepare table II.F.1.-1 are characteristic of the emissions which may arise as a result of lease sale 55. It is recognized that this data may not accurately reflect meteorological conditions and actual physical factors in the eastern Gulf of Alaska which may influence the impacts of the emissions on onshore areas. The emissions data is from OCS sources which are comparable to those which may be used to explore and produce resources associated with this sale.

In addition to the offshore activities, certain onshore facilities at Yakutat which have the potential to generate air emissions would be developed if a commercially recoverable find is established. These could include a marine terminal and a liquified natural gas plant (LNG). An air quality analysis on a proposed Pacific Alaska LNG plant at Nikiski on the Kenai Peninsula shows that no national ambient air quality standard would be violated (Dames and Moore, 1979). The analysis took into consideration all air emissions associated with loading and unloading LNG carriers at marine terminals as well as the emissions from the LNG facility itself. These emissions would, to the

extent they are from sources on land or within the state's territorial sea, be subject to all EPA regulations and all state and local air quality control laws. Under EPA's new source review regulations, the Pacific Alaska LNG facility would be required to install Best Available Control Technology (BACT) for NO_x and CO emissions. Offshore activities which have the potential to produce emissions which could significantly affect onshore air quality will be subject to Interior regulations which require the reduction or mitigation of emissions to avoid significant onshore effects.

Table II.F.1.-1
Representative Air Emissions Inventory
From an OCS Exploratory Vessel and Production Platform [1/]

Criteria Pollutant	Exploratory Vessel [3/] gr/sec [2/]	Exploratory Vessel [3/] tons/yr [2/]	Production Platform [4/] gr/sec [2/]	Production Platform [4/] tons/yr [2/]
Carbon Monoxide	2.71	94.33	3.77	131.10
Hydrocarbons	0.99	34.36	NA	NA
Nitrous Oxides	12.48	433.94	15.81	549.79
Sulfur Dioxides	1.07	37.05	3.27	113.65
Particulates	1.67	58.23	0.32	31.99

1/ The emission data are taken from specific facilities operating in OCS areas off Alaska. The emission rates are summed across all sources on the exploratory vessel or production platform.

2/ Emission rates are expressed in either grams per second (gr/sec) or tons per year (tons/yr). The origional data for both sources were expressed in instaneous rate of gr/sec. These have been converted to ton/yr emissions for comparison against exemption provisions in the regulatory programs. A conversion factor of 34.775 was used which assumes constant daily operations of emission sources over a year.

3/ Source of emissions data is Odeco, Inc. Ocean Bounty exploratory vessel operating in Gulf of Alaska and lower Cook Inlet. (Phillips Petroleum, 1978).

4/ Source of emissions data is production platform Baker in upper Cook Inlet offshore reservoir near Kenai. Hydrocarbon emission data for the production platform were not available as reported by Dames and Moore, 1979.

Sources: Phillips Petroleum, 1978; Dames and Moore, 1979.

G. BLM Studies Programs

1. Environmental Studies Program: In each OCS area for which development is proposed, extensive environmental studies are conducted before such development is allowed. As Manager of the Outer Continental Shelf Leasing Program, the Bureau of Land Management (BLM) of the Department of the Interior (DOI) has initiated the Outer Continental Shelf Environmental Assessment Program (OCSEAP) as an essential part of its management responsibility to ensure that the Alaska marine environment is not deleteriously disturbed. The environmental study program for the Gulf of Alaska is conducted under interagency agreement for BLM by the OCSEAP offices of the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce.

In May 1974, BLM requested that NOAA initiate a program of environmental assessment in the northeastern Gulf of Alaska (NEGOA) in anticipation of possible oil and gas lease sales in the region. A major expansion of the environmental assessment program was requested by BLM in October 1974, to encompass 8 additional areas of the continental shelf of Alaska during the fiscal year 1975-76, including the Beaufort Sea area. A program of studies for the lease areas of Alaska, plus some non-area specific studies, was planned. This program assembled existing historical data about the Alaska OCS, as well as addressing new study needs to provide a basis for assessment of impacts of petroleum exploration and development.

Major efforts of studies beginning in 1975 in the Gulf of Alaska were those of broad-scale surveys or reconnaissance. They produced information defining circulation patterns, current trajectories, sea floor faults, seismic activity, areas of unstable sediments, critical habitats, and biological populations. They also provided baselines for hydrocarbon and trace metal concentrations. Special studies were amplified beginning in fiscal year 1978 to fill data gaps in nearshore processes and to determine the possible impacts of OCS development on the environment.

2. Objectives of the Alaska OCS Environmental Assessment Program: The following discussion summarizes the major efforts and rationale for past, present, and projected environmental research in the Gulf of Alaska. Studies information resulting from this program is addressed in sec. II and III.

About mid-July 1979, the Alaska OCS Office received a rough draft copy of an Interim Synthesis Report on the northern and eastern Gulf of Alaska from Science Applications, Inc., through OCSEAP. The Interim Synthesis Report contains considerable descriptive information on the affected environment and represents a comprehensive encyclopedia of environmental information which can be referred to for further detailed descriptions of similar topics contained in sec. II of this draft EIS.

a. Contaminant Distributions: Chemistry efforts began in fiscal year 1975 as a program in the NEGOA lease area intended to establish predevelopment light and heavy hydrocarbon and trace metal concentrations.

The initial programs in NEGOA involved extensive sampling along carefully designed station grids in an attempt to determine hydrocarbon and trace metal baseline concentrations.

A significant portion of the fiscal year 1978 chemistry program was directed toward process-oriented studies designed to give insight into the processes that control the distribution of hydrocarbons in the Alaska OCS. Questions of seasonal variability of pollutant concentrations in water, biota, and sediments in relation to either microbial activity and high biological productivity or exposure to petroleum were commenced in lower Cook Inlet. The ongoing programs have aided efforts to quantify the hydrocarbon weathering processes under natural weathering and dispersal conditions.

b. Geologic Hazards: Geologic hazards to petroleum-related operations in the Gulf of Alaska center around seismicity, surface, and near-surface faulting, sediment instability, erosion and deposition, and stratigraphic hazards.

Many of the hazards present in Alaskan lease areas also occur in other U.S. shelf areas. However, in Alaska, these problems are unique in terms of both severity and complexity. A knowledge of the nature, frequency, and intensity of severe environmental events is essential since the greatest hazards to production-related structures and activities, as well as the greatest effect on the environment will more than likely occur in conjunction with environmental extremes. Seismic field studies in the gulf began in fiscal years 1975 and 1976 as supplements to existing studies being funded by other agencies. In the NEGOA, BLM is directly supporting a portion of the seismograph work in an ongoing USGS study employing a land-based network of seismograph stations. OCS funding has permitted the extension of the seismic network to give better coverage of the Gulf of Alaska continental shelf.

The major objective of these seismic studies is to determine a probability scale for earthquake hazards with reference to petroleum exploration and development. A requisite for accomplishing this objective is the improvement of the statistical reliability of the existing data base through continuation of present observational programs and use of additional or improved instrumentation, such as ocean bottom seismometers (OBS) and strong-motion accelerometers.

In addition to potential hazards from seismic activity, there are additional potential natural hazards resulting from volcanism, faulting, sediment instabilities, and seismic sea waves. Seismicity is a dynamic phenomenon with major events occurring at large-time scales. Therefore, the Alaska study efforts are guided by the rationale that studies should be of maximum duration practicable and that future emphasis should be placed on the utilization of additional and more sensitive instrumentation (e.g., OBS units) to improve the capability of making useful predictions with the data base realistically achievable.

The Gulf of Alaska is tectonically complex, and numerous faults have been identified. The activity of these faults is unknown but important. The probability of movement needs to be known. Some of these faults are active, and displacements can affect man-made structures, such as drilling platforms, drill casings, and pipelines. Ongoing seismic studies will attempt to further delineate the activity of these faults.

Further potential hazards in the Gulf of Alaska are associated with sediment instability. High rates of sedimentation of fluvial and glacial outwash materials occur along parts of the coast (e.g., the Icy Bay and Copper River Delta regions), producing large, unconsolidated sediment deposits. Some of these deposits have undergone extensive slumping and others have been identified as potentially unstable. Slumping may be triggered by low magnitude earthquakes resulting from fault movement. In order to predict the instability of sediments resulting from earthquakes, cyclic loading by storms, or man-induced loading, it is necessary to emplace ocean floor instruments such as accelerometers and possible piezometers.

The likelihood of sediment failure actually occurring in areas identified as potentially unstable can be evaluated only by studies of the sediment geotechnical properties. For example, slumping that has occurred in an area will result in a sediment mass that is either more stable now as a result of slumping, or less stable, depending on the amount of water incorporated, the degree of consolidation, and style of movement.

Shelf faulting and sedimentation studies seek a description of potential hazards so that environmental risks can be minimized, either by outright avoidance or by appropriate regulation of facilities. Certain features identified as potentially troublesome during the regional reconnaissance of the lease area are selected for further detailed study. The reconnaissance phase constitutes about a 2-year effort, with focused studies of special problems taking an additional 2 to 3 years. (These time estimates are approximate and vary with the lease area size, geological complexity, and the specific nature of the hazards identified.)

Shelf faulting and sedimentation studies in the Gulf of Alaska began in fiscal year 1976. The NEGOA study, begun the previous year by the USGS, has produced basic information on the geologic hazards of the area, including the location of probable active faults, potentially unstable sediments, and areas of erosion and deposition on the shelf. This information has had a significant influence on tract selection, stipulations, and drilling regulations in NEGOA. The work is being continued through fiscal year 1980 to gather additional tract-specific hazards information in preparation for the second proposed Gulf of Alaska sale.

c. Oceanographic and Meteorological Hazards: Studies of oceanic and meteorological hazards in the Gulf of Alaska are included in a synthesis of existing data and literature in the form of a climatic atlas of the entire Alaskan coastal region compiled by the Arctic Environmental Information

and Data Center and the National Climatic Center. This atlas summarized the present knowledge of marine and coastal climatology in the Gulf of Alaska, the Bering Sea, and the Beaufort/Chukchi Seas. More detailed studies of severe storm hazards are required for prediction of types and frequencies of extreme storms and storm tracks associated with hindcasts.

d. Pollutant Transport: In an assessment of the potential impact of OCS development on the marine environment, the transport and transformation of petroleum-related contaminants is of key significance. Petroleum or other contaminants introduced into the environment can be transported in the atmosphere, water column, and sea ice, acting as an intercoupled system. During the transport process, oil and other contaminants undergo continual physical and chemical change brought about by such processes as evaporation, flocculation, emulsification, weathering, biodegradation, and chemical decomposition.

Transport studies are specifically designed to provide data that will enable the Department of the Interior and other agencies to:

- plan stages and siting of offshore petroleum development to minimize the potential risk to environmentally sensitive areas.

- provide trajectories, coastal landfall, and effects of cleanup operations in the event of an oilspill or the introduction of other contaminants, trajectories, coastal landfall.

- assist in planning the location of long-term environmental monitoring stations in the study area.

Oceanographic investigations in the Gulf of Alaska have been carried out sporadically for the past half century, with an increased intensity during the last 20 years. Most studies have been conducted in the open ocean during summer months. This existing knowledge has been limited mainly to a description of large-scale circulation patterns, based almost exclusively upon periodic, widely-spaced hydrographic data. Such information does not provide adequate insight into the smaller-scale circulation features active on the continental shelf that is responsible for the coastal transport of contaminants.

Prior to the Alaska OCS program, no systematic physical oceanographic studies had been conducted on the Gulf of Alaska continental shelf. Conspicuously absent were long-term direct measurements of coastal currents and winds. Transport investigations in the Gulf of Alaska were designed to proceed sequentially from a regional description of mesoscale oceanographic and meteorological features to an analytical phase of process studies. The various elements of the investigations have included literature summaries, Langrangian and Eulerian current measurements, hydrographic station data, remote sensing data, and computer models. Meteorological investigations have concentrated on field observations and computer simulation of coastal wind patterns, which, in Alaska, can differ markedly from synoptic geostrophic winds because of the strong effects of coastal orography and land-sea temperature differences.

As the NEGOA was the first OCS area in Alaska to be selected for oil and gas development, study efforts began there in 1975. Between that time and fiscal year 1977, studies were concentrated primarily in NEGOA, with much smaller efforts in the western gulf and lower Cook Inlet. Leasing in NEGOA occurred in April 1976, with results of transport studies contributing significantly to tract selection. By fiscal year 1977, all the previously described transport elements were involved in NEGOA studies.

Since 1977, studies in NEGOA have progressed to a stage where a comprehensive view of the regional oceanography and meteorology has emerged. Areas of probable impingement on the western side of Kayak Island and the entrance to Prince William Sound have been identified through field studies and computer simulation. The NEGOA program in fiscal year 1979 and fiscal year 1980 will consist of a modest field effort to fill data gaps for the new sale area and for completion of data analysis for the Kayak Island/Hinchinbrook entrance region.

Practically the entire body of existing information on mesoscale oceanic and atmospheric circulation patterns in the Gulf of Alaska has resulted from OCS research. Prior to the Alaska OCS program, no such information existed. Studies here, as elsewhere, have initially focused on offshore areas with a spatial resolution of some tens of kilometers. The rationale for this offshore rather than nearshore initial emphasis is several-fold. First, as mentioned, little previous transport information existed commensurate with the spatial scale at which many OCS development activities will occur. Second, mesoscale studies are necessary to identify potential contaminant impingement areas. Third, smaller-scale, nearshore processes are often driven by mesoscale mechanisms; thus, offshore studies can provide necessary boundary information for subsequent inshore projects. Fourth, there has been a general lack of nearshore development scenarios to derive criteria to guide the design and placement of appropriate studies. Fifth, considering budgetary constraints and the amount of coastline included in the present lease area, substantial nearshore investigations must be justified on the basis of either (1) process-oriented studies in select "model systems" whose dynamics may reasonably be extrapolated to other regions; or (2) the coincidence of an important biological community with either planned nearshore development activities or likely impingement established from previous studies.

Most field activity associated with transport studies in the Gulf of Alaska is to complete the data base in the proposed sale 55 lease area. The effort in fiscal year 1980 will be devoted almost entirely to data analysis, interpretation and synthesis, and continuation of modeling activities. The modeling effort has progressed sufficiently to be routinely applied, and for the first time, it will have the benefit of oil weathering algorithms and realistic surface wind inputs obtained from other studies. Field studies will be limited to an assessment of the nearshore wind and current patterns around Yakutat Bay to complete the circulation model for the nearshore zone.

Also during fiscal year 1980, a major emphasis of the Gulf of Alaska transport studies program will be the synthesis of all available information on oceanographic and meteorological circulation patterns and processes. Fiscal year 1979 efforts were begun on this task. The expected product is a single report, prepared through a collaborative effort among investigators of all relevant studies, summarizing what is known about the Gulf of Alaska as a transport system. Initial planning, including specific task assignments, was completed during the 1978 physical oceanography/meteorology workshop.

e. Living Resources: A major reason for conducting studies of biological populations in the Gulf of Alaska is to determine which populations, communities, and ecosystems are at risk from either acute or chronic insults. Estimates of the distribution and abundance, migration, feeding sites, and behavior of populations are among the first studies undertaken to establish potential vulnerability. Further criteria of uniqueness, importance to the ecosystem, sensitivity, and aesthetic considerations are used to define fully and assess the value of a species or community and the consequences of the insult.

When vulnerability is indicated, detailed site-specific studies are undertaken to focus on processes, trophic and population dynamics, sensitivity to disturbance, habitat dependence, and physiological characteristics. The interrelationships among various components and processes of ecosystems will be increasingly emphasized in site-specific studies.

The first several years of biological studies in NEGOA have generally been concerned with establishing the distribution and abundance of key biological species through reconnaissance surveys. For the higher trophic levels, these investigations have also had as an objective the identification of critical habitats, migratory routes, and principal breeding locations of seabirds and marine mammals. Much of the required data on abundance, distribution, and timing of important or characteristic species in most lease areas had been obtained by the end of fiscal year 1977. Those few reconnaissance studies remaining will be completed in fiscal year 1980. These studies pertain to data gaps in commercial fisheries and in marine birds and mammals. The abundance of larvae and juveniles of important commercial fish species in the proposed lease area is uncertain and will be investigated. Benthic surveys for commercial shellfish will also be conducted to supplement the large amount of existing information from the sale 39 area. Information on the estuarine use of migratory birds around Cape Yakutat will be surveyed, and the habitat use of the lease area by cetaceans, especially the endangered species of whales will be initiated in fiscal year 1980.

f. Effects: The program of effects research is an ongoing effort, not coupled specifically to the schedule for any particular lease area. The results of the effects studies are used in establishing possible causal relationships between OCS-related perturbations and biological changes. The results form the basis for developing discharge regulations and operating stipulations. In addition, the studies program is evaluating biological

responses to OCS stresses for their potential usefulness as early warning indicators or monitoring aids in detecting or quantifying environmental change.

The program of effects research was initiated at the inception of the lease area studies program. Effects studies to date have consisted mainly of laboratory efforts. In fiscal years 1979 and 1980, however, there will be a substantial shift toward field studies designed (1) to verify or validate laboratory observation under realistic field conditions, and (2) to generate data on exposure concentrations and compositions likely to occur under various environmental conditions. The field observations and data are important for improved interpretation of laboratory results. In addition, there will be an extension of the program from its previous focus on the direct effects of petroleum to include studies of other OCS-related perturbations on the marine environment.

3. Socioeconomic Studies Program: The socioeconomic studies program (SESP) of the Alaska OCS Office was created to determine and assess the potential onshore social, economic, and physical impacts from outer continental shelf oil and gas development. As a multiyear, multidiscipline program, the SESP conducts studies on the sociological and anthropological aspects of diverse groups. The SESP focuses on a longitudinal investigation of the development process, beginning from the assembly of predevelopment information to the monitoring of project development as it affects specific communities, regions, or the state as a whole. In addition, the program makes economic analyses of rural and urban communities, regions within the state, and the state as a whole, with assessments of both natural and man-made infrastructures.

The overall methodology is divided into 3 broad research components. The first component identifies an alternative set of assumptions regarding the location, the nature, and the timing of future petroleum events and related activities. In this component, the program takes into account the particular needs of the petroleum industry and projects the human, material, economic, and environmental offshore and onshore development requirements of the regional petroleum industry.

The second component focuses on data gathering that identifies those quantifiable and qualifiable facts by which OCS-induced changes can be assessed. The critical community and regional components are identified and evaluated. Current endogenous and exogenous sources of change and functional organization among different sectors of community and regional life are analyzed. Susceptible community relationships, values, activities, and processes are also included.

The third research component focuses on an evaluation of the changes that could occur due to the potential oil and gas development. Impact evaluation concentrates on an analysis of the impacts at the statewide, regional, and local level.

The statewide/regional analysis focuses on the statewide effects of cumulative and incremental lease sales and the distribution of these effects among certain

defined subregions of the state. The local level analysis focuses on the direct effects of the lease sale on affected communities.

The SESP identified the study area for the Northern Gulf Petroleum Development region to run from Cape Fairweather west to longitude 150°, focusing on Yakutat, Cordova, and Seward for local level analysis. Anchorage was identified as an additional impacted area. The following major study tasks were conducted in the Northern Gulf Petroleum Development region:

a. Petroleum Development Scenarios: Numerous oil and gas options were constructed through a combination of USGS resource estimates and locational data from independent geologic assessment. A parametric economic analysis was conducted to assess their economic viability. These scenarios were then detailed according to technology; facility, material, and manpower requirements; and scheduling. Four different levels of petroleum development were prepared.

b. Statewide and Regional Population and Economic Forecasts: A non-OCS base case was developed that assumed no new significant oil, gas, or other mineral development in Alaska beyond current commitments. Then forecasts were prepared for 4 different potential levels of oil and gas development. Forecasts to the year 2000 were for population, employment, income, and state government fiscal impacts.

c. Impacts on Socioeconomic and Physical Systems: Community facility standards were developed and applied to the non-OCS base case and each of the 4 oil and gas scenarios. The data components included education, public safety, recreation and tourism, utilities, housing, and local government resources, investments, and capital needs.

d. Impacts on Transportation Systems: A methodology was developed and applied to assess impacts of the land-, air-, and water-related transportation modes. The ability of these modes to move goods and materials in and out of the region and throughout the state for the non-OCS base case and for the 4 scenarios was assessed.

e. Impacts on the Sociocultural System: Issues analyzed were traditional use of all resources including land, marine, and ice environments; subsistence; cultural values; politics; interethnic relationships; social health; and family relationships.

At the inception of the program in September 1976, the BLM/Alaska OCS Office contracted Peat, Marwick, Mitchell and Co. (PMM & Co.) as the prime contractor for the SESP. PMM & Co. has the responsibility to hire subcontractors to perform the work required for impact assessment. The following is a list of contractors who have conducted research tasks for the Northern Gulf Petroleum Development Region and Impacted Area: Peat, Marwick, Mitchell and Co.; Jim Lindsay and Associates; Dames and Moore; Marsha Bennett; Holly Reckord; Peter Eakland and Associates; University of Alaska Sea Grant Program; Alaska Consultants,

Inc.; Policy Analysts, Limited; Institute of Social and Economic Research; U.S. Coast Guard, and the Pacific Northwest Forest and Range Experiment Station of the U.S. Forest Service.

III. ENVIRONMENTAL CONSEQUENCES

A. Basic Assumptions Used in Analysis

1. Basic Assumptions Regarding Causes of Possible Impact Resulting from the Alternatives including the Proposal: As previously indicated, a total of 792,085 hectares (1,957,242 acres) are proposed to be leased for oil and gas exploration and development (667,737 hectares for Alternatives IV and and 504,153 hectares for Alternative V). Undiscovered recoverable resources resulting from the proposed sale are estimated by the USGS for the mean case at 450 million barrels of oil and 1.25 trillion cubic feet of gas.

Within the following sections, every effort has been made to quantify impacts which may result from this proposed sale. Where quantification has been possible, the mean case has been utilized. In addition, mean variables have been used in measuring impact. Therefore, it should be kept in mind that all figures are relative to mean impact. In cases where the anticipated facilities deviate from the description of this mean case, as in the maximum case and Alternatives IV and V, those differences will be discussed. There are, however, many areas in which quantification of impacts is difficult due to a lack of data and the variability of factors affecting any potential development.

This section will describe in detail those facets of the proposed action which could affect the offshore natural environment. A further discussion and description of oil and gas operations is found in Appendix E.

a. Exploratory Activities: It is assumed that 14 exploration and delineation wells may be drilled in the northeast Gulf of Alaska as a result of the proposed sale. Moderate exploratory drilling activity would take place during the initial 5 years (leases are presently issued for 5-year periods as set forth in 43 CFR 3302.2), with a maximum of 2 exploratory rigs working at any one time.

Vessels for drilling exploratory wells would probably come from the Gulf of Mexico, offshore Canada, and the North Sea. Three types of rigs--jack-ups, semi-submersibles, and drillships--may be used. Once a drilling rig is in place and drilling commences, special muds are circulated through the wellbore to provide pressure control, lubrication of the drill bit, and removal of drill cuttings from the hole.

Drill cuttings are composed of rock fragments and liquids contained in the geological formation through which the drilling bit is traveling. To remove the drill cuttings, drilling mud (fluid), from the reservoir (mud tanks) is circulated down the hole (well) through the drill pipe. Drilling mud is passed out the drilling bit nozzle picking up drill cuttings, and returned to the surface between the drill pipe and walls of the bore hole and/or casing. At the surface, drill cuttings are physically separated from the mud by screening and washing techniques. After the drill cuttings and drilling mud are separated, the drill cuttings are discharged to the ocean and the mud is returned to the mud tank for recirculation down the hole. Drilling mud that is not able to be separated from the drill cuttings is discharged to the ocean.

Removal of drilled cuttings from the hole is only one function of drilling mud. To obtain satisfactory results in the completion of any well, drilling

muds have a variety of functions. To receive maximum benefit from drilling mud at each hole, the mud engineers must change the drilling mud component as new physical information is found at deeper well hole depths. Discharges of drilling mud must comply with regulations found under OCS Order No. 7 and 40 CFR (Part 435, Section 435.22). Both of these regulations restrict the discharge of any drilling mud containing oil. Additionally, OCS Order No. 7 forbids the discharge of drilling muds containing toxic substances into the ocean waters. The Geological Survey, Conservation Division, states if any oil-based mud is used, the mud would not be released to the ocean, and cuttings would be cleaned or barged to shore for disposal. Currently, the only mud components used to make up drilling mud that must be registered with the Environmental Protection Agency, are bacterialcides.

In drilling, the volume of drilling muds and drill cuttings is dependent on the well and the hole size; both dictated by the well casing program. The estimation of the volume of both drilling muds and drill cuttings for the exploration and delineation wells is based on USGS estimates developed for an average well depth of 4600 m (15,000 ft). These volumes are summarized on table III.A.1.a.-1. for the proposal as well as Alternatives IV and V.

The amount of drilling muds discharged during the normal operation of a well depends mainly upon the type of formation drilled. The more active clays contained in some formations are the more difficult to remove from muds, thus requiring more mud disposal. The formation and conditions also dictate the mud densities required. This determines the cost and type of equipment needed in separation of mud compounds. Other considerations include the cost of the additives and disposal. Generally, the more difficult it is to separate solids from the mud compound, the greater the need for discharge. Conversely, the more costly the additives or disposal, the lesser the discharge. The USGS estimates that the overboard loss of mud (discharge) would be small; downhole mud loss may be 15 m^3 (20 yd^3), and that the remainder would be recycled and reused.

Approval of mud disposal may or may not be site-specific, but may be applied to the entire drilling program. Drilling muds are normally discharged: (1) with the drill cuttings; (2) when cleaning shale or sand tanks; (3) while drilling the upper portion of the hole before establishing circulation to the drilling platform; and (4) upon disconnection of a marine riser. The last 2 cases apply only to operations from floating drill platforms and not to jack-ups or fixed production platforms.

Chromium, present in some marine drilling muds, is of concern because of its possible toxic effects on marine organisms. Overboard loss or discharge of drilling fluids would introduce some of this chromium into the marine environment. Chromium occurs in the form of an organic complex (ferro) chrome lignosulfonate, which may be used in mud programs on the Alaska OCS. Most oil-based muds are used to prevent blowouts and to contain cases during well completion. No oil-based muds are allowed to be dumped into the marine environment.

The use of chrome materials, oil, and other toxics in some Pacific offshore mud systems has been avoided for several years. Sodium lignosulfonate has replaced ferrochrome lignosulfonate in some Pacific offshore mud systems.

Barium sulfate is essentially non-toxic to marine organisms. It is used as a weighting agent to control formation pressures while drilling in the middle to bottom portions of the hole. Chromium lignosulfonates are thinners that are placed into a mud system for control of viscosity, gel strength, and filtrate loss. There is strong environmental concern about products containing barium and chromium because of the possibility that certain toxics could be released into the environment.

Occasionally, abnormal formation pressures, exceptionally tight formations, or other problems require the use of oil-based mud or highly treated drilling muds. Drill cuttings are then separated and cleaned of entrained oil before being discharged overboard. The drilling muds are retained and shipped to shore and stored in tanks for future use.

Solvents which are used primarily to clean equipment on mobil rigs and platforms pose no significant threat to the OCS environment. Solvent that is spilled on the platform is collected by curbs, gutters, drains, or drip pans. The drainage is then treated in a gravity separator or transferred to the production treatment system. Discharge must meet EPA oil and grease limitations. Sewage treatment and disposal on offshore rigs and platforms is very similar to a holding and settling tank, but with the addition of a chlorination system. In this case, the system is normally a fiberglass container somewhere on the platform into which all toilet, kitchen, and laundry drains discharge. The usual settling and bacterial digestion takes place in the tank and the final effluent is chlorinated.

EPA regulations and revised Gulf of Alaska OCS Orders (Dec. 21, 1979; Federal Register) require that the effluent have a minimum cloride residual of 1.0 mg/1 after a minimum retention time of 15 minutes. As in every other instance in which chlorination is used as a method of disinfection, the potential exists for the generation of trace quantities of chlorinated compounds that may be harmful organisms. However, the effects of such trace quantities are only now beginning to be investigated.

Since all sites occupied by drilling rigs must be avoided by fishing boats, this could result in the removal of some fishing grounds during the exploratory phase. Jack-ups and drillships remove 1-2 hectares (2-5 acres) per structure, while semi-submersibles using 458 m (1500 ft) anchoring radii would remove up to 65 hectares (162 acres) each. Permit applications for drilling normally request a 1-mile avoidance area. If such an avoidance buffer is included around each drilling rig, then 804 hectares (2011 acres) of a block would be temporarily withdrawn from use. During the exploration phase, 1608 hectares (4022 acres) could be removed from fishing at any one time assuming the proposal (mean case) or Alternatives IV and V. Up to 3216 hectares (8044 acres) could be removed from fishing assuming the maximum case.

Support services onshore would be required during the exploratory phase. It has been assumed that the existing supply base, owned by ARCO and located at Yakutat, would be used. This support base consists of a dock, warehouse, storage yard, office and a water supply-storage facility. Peak exploratory activity during this phase may require 4 service vessels assuming the proposal (mean case). Approximately 8 service vessels would be necessary for the high case.

Helicopters will be used to transport crews from Yakutat to the exploratory rigs. The state-owned airport at Yakutat will be the location for the helicopter support, with Cape Yakataga as a back-up facility to be used during periods of inclement weather in the Yakutat area. The exploratory phase will require 3 helicopters assuming the mean case and 5 helicopters assuming the high case.

Peak employment during the 5-year exploratory phase is estimated at 87 persons for service vessels and helicopters, 30 persons to operate the supply base, and 152 persons involved in the offshore drilling. Assuming the maximum case, it is estimated that 120 persons would be required for the service vessels, 60 persons to operate the supply base, and 227 persons involved in offshore drilling. For a detailed description of the basic assumptions used to estimate employment and summary tables of direct employment, refer to Appendix E.

b. Development Activities: If oil and gas are discovered as a result of this proposed sale, fixed platforms may be installed offshore. Technology presently exists to install platforms in water depths which would be encountered as a result of this proposed sale (30-400 m, 99-1320 ft).

It is assumed that all production platforms would be constructed outside of Alaska; either at existing U.S. west coast or Japanese shipyards. The platforms would then be transported to location via barges.

Once platforms are installed, 1 or 2 drilling rigs would be placed on each platform to drill production wells. For purposes of this analysis, it is estimated that as a result of this proposal there may be 70 development wells drilled from 2 platforms. The maximum case would involve the drilling of 128 production wells from 3 platforms. Since all sites occupied by production platforms must be avoided by fishing boats, this could result in the removal of some fishing grounds. Each platform occupies a site of 1-2 hectares (2-5 acres). Assuming a 1-mile buffer zone around each, 1608 hectares (4022 acres) might become off limits for fishing because of platforms installed as a result of this proposed sale. The sites would be usable again once platforms are removed, after termination of production.

Paleontological information from development wells is not as critical as that from exploratory wells. As a consequence, drilling muds are recycled from one well to another. The volume of drill cuttings has been estimated at 19,152 m^3 (25,200 yd^3) assuming the proposal, and 33,744 m^3 (44,400 yd^3) for the maximum case.

The development period is the period of most activity. Not only would some exploratory drilling (1985) and development drilling be taking place, but platforms would be gradually coming on production. It is estimated that this phase, beginning in about 1985, may continue until about 1988. Peak vessel requirements during this phase are estimated at approximately 10, with 4 helicopters in use.

In Alternatives I, III, Iv, and V, the option exists that a floating production system be assumed with oil produced into a moored barge and transferred to tankers offshore. The production system would utilize 2 semi-submersibles converted to production platforms which would be anchored on location for the life of the field. Such a system would necessitate subsea completions performed from semi-submersibles or drillships.

Subsea completion units consist of a wellhead at a distance from a platform connected to the platform by flowlines. These units would result in sea floor obstructions that could foul trawling gear or ship anchors. The potential for damage to the assembly causing uncontrollable flow is reduced, somewhat, because of the strength and durability of the material that is used in sea floor completions, OCS Orders requiring redundant safety devices, and proposed OCS Order #1 requiring the marking of subsea systems to prevent such accidents.

Onshore activities during the development phase would include the expansion of the support base in Yakutat, construction of an oil terminal in Yakutat, and the laying of both onshore and offshore oil pipeline.

A pipe-lay barge would disturb the sea floor by the placement of pipe and emplacement of anchors. The anchors and chain emplacement could also temporarily affect fishing. The pipe-lay barge would place 8 anchors and start laying a pipeline on the ocean floor. As an estimate, the anchors for the lay barge would be moved for every 1.6 km (1 mi) of laid pipeline. Two anchors could be placed on each side of the lay barge as far out from the barge as 1.6 km (1 mi). These 8 anchors would be temporarily placed and would disturb the sea floor. The pipelines would be laid on the sea floor for the duration of petroleum production and could be abandoned or removed. These pipelines would disturb the sea floor, but could provide an artificial reef for marine life.

For the proposed tracts, an estimate of 160 km (100 mi) of offshore pipeline could be installed. These pipelines could disturb a total of 240 hectares (600 acres) of sea floor. The anchors and chains from the lay barges would also disturb the sea bottom continuously along the 160 km (100 mi) of pipeline.

Onshore pipeline will include 16 km (10 mi) of oil pipeline. The oil pipeline will be routed to an oil terminal located on Monti Bay (Yakutat). The offshore loading option would require 16 km (10 mi) of offshore oil pipeline. Refer to table III.A.1.b.-1 for detailed estimates of pipeline length and disturbance.

The LNG terminal assumed in the maximum case of the proposal would be located on Monti Bay (Yakutat) and require approximately 80 hectares (200 acres). It is anticipated that this facility would utilize an air cooling system and would require water only during the hydrostatic testing procedures prior to operation.

The transportation of oil via tanker to the west coast would require approximately 2 tankers per week. The transportation of LNG via tanker would also require approximately 2 tankers per week.

The support base will require expansion during the development phase to provide for the increased activity offshore. The expansion is estimated to require an additional 10 hectares (25 acres). This land requirement would be the same for all alternatives (including the proposal).

Employment will be the highest during the development phase due to the increased offshore drilling program and the construction of onshore facilities. The peak development phase will occur in 1987 with a total average annual employment of 896 persons. This would include 159 persons involved in offshore drilling, 110 persons employed by service vessels and helicopter support, and 628 persons necessary for the onshore construction of facilities. The peak employment, assuming the maximum case, would occur in 1987 with a total of 1,898 persons (220 for offshore drilling, 160 for service vessels and helicopter support, and 1,518 for onshore construction facilities). For a detailed description of the basic assumptions used to estimate employment and summary tables of direct employment, refer to the Appendix.

c. Production Activities: During peak production, employment offshore to support oil and gas operations would be less than during the development phase. Transportation requirements, and consequently onshore operating base employment, would also be reduced. At peak production, about 3 helicopters and 4-5 service vessels would be used (4 helicopters and 6 service vessels for the maximum case). During peak production, the average annual employment would be 562 persons; 332 persons involved in offshore drilling and onshore production facilities, and 230 persons employed by service vessels, tankers, and helicopter support. (Assuming the maximum case, a total of 765 persons would be involved; 485 for offshore drilling and onshore production, and 280 for service vessels, tankers, and helicopter support). For a detailed description of the basic assumptions used to estimate employment and summary tables of direct employment, refer to the Appendix.

The production platform contains all the equipment and performs the same function as a field gathering station does at onshore locations. For purposes of this analysis, it is assumed that 70 development wells would be produced (mean case). Maximum daily production of 140,300 barrels per day of oil could result from the amounts of recoverable resources estimated by the USGS. As previously indicated, production is expected to be conducted from 2 platforms.

When oil and gas are produced, waters associated with oil and gas pools are often produced also. These waters are called formation waters. In some pools, water is produced with the oil in early stages of production, whereas in others, appreciable water is never produced with oil over the life of the field.

Most formation waters are brines, characterized by an abundance of chlorides, mostly as sodium chloride, and have concentrations of dissolved solids several times greater than that of seawater. The total amount of mineral matter commonly found dissolved in oil-field waters ranges from a few milligrams per liter (mg/l), nearly freshwater, to approximately 300,000 mg/l, a heavy brine. However, a common range is generally from 80,000 to 100,000 mg/l. It is highly unlikely that any of the produced formation water resulting from this proposed sale would ever be piped ashore. Both economic and environmental considerations weigh heavily towards choosing between treatment and release of the water into the ocean at the platform site, or reinjection into subsurface formations. Reinjection is utilized where feasible as a secondary recovery technique by pumping formation water, under pressure, back into the lower levels of the petroleum-producing zone. This method of disposal requires a

separate well plus some water treatment to insure that the injected water is compatible with the host reservoir.

The oil and water mixture that comes from the gas-oil separator on the platform goes first to a free water knock-out where the free water is separated by gravity from the oil. Should some water be emulsified with the oil, this mixture is sent through heater and/or chemical treaters to break the emulsion and separate the oil and water. The oil is collected and the water is further filtered and treated to meet EPA effluent standards before being disposed of overboard. However, the water is still void of dissolved oxygen and contains quantities of dissolved minerals.

Although any estimate of the amount of produced formation water resulting from this proposed sale is difficult to estimate prior to exploration, it is assumed that 0.6 barrels of water will be produced for every barrel of oil produced. Based on this assumption, it is estimated that the average annual production of formation water would be 14.2 million barrels and a total production of 270 million barrels.

A 35-year production period for gas and a 19-year production period for oil has been used in this analysis. When a reservoir has been depleted to a level at which it cannot be profitably produced, operations are terminated. Small amounts of oil may be recovered, as condensate from gas wells, after termination of all oil wells.

OCS Orders require wells to be plugged, the casing severed well below the mudline, the platform removed, and all obstructions cleared from the area. Major trunklines may be used for future production from adjacent areas, but smaller lines would probably be abandoned in place. Abandonment consists of purging the lines of entrained hydrocarbons by water flushing (the water disposed of onshore after reclaiming the oil) and severing the ends below the mudline. Water from the flushing operation would be disposed of according to state and Federal regulations. The necessity for removal of pipelines nearshore is usually regulated by the state.

d. Sale 55, Gulf of Alaska Oilspill Analysis: The following discussion quotes at length from the USGS oilspill analysis (USGS Open File Report No. 79-1784).

An oilspill risk analysis was conducted to determine the relative environmental hazards of developing oil in different regions of the northeastern Gulf of Alaska Outer Continental Shelf lease area. The study analyzed the probability of spill occurrences, likely paths of the spilled oil, and locations of resources vulnerable to spilled oil. The combined results yielded estimates of the overall oilspill risks associated with development of the proposed lease area. The analysis implicitly includes estimates of weathering rates and slick dispersion, and an indication of the possibility of mitigating effects by cleanup efforts. The leasing of the tracts proposed for sale 55 will result in an expected number of 3 spills. The probability that land will be contacted by one or more spills within 30 days is 0.84; however, this probability varies greatly for the different targets and different contact times.

Oilspills are one of the major concerns associated with offshore oil production in the northeastern Gulf of Alaska area. An important fact that stands out when one attempts to evaluate the significance of accidental oilspillage for this, or any proposed lease area, is that the problem is fundamentally probabilistic. A great deal of uncertainty exists about the amount of oil that will be produced, and the number and size of spills that might occur during the life of production, as well as the wind and current conditions that exist at the time of a spill occurrence giving direction to the oil slick. While some of the uncertainty reflects incomplete and imperfect data, considerable uncertainty is simply inherent in the problem of describing future events over which complete control cannot be exercised.

In view of this inability to predict with certainty future oilspill effects, it is important to consider the range of possible effects that could accompany oil and gas production. It is equally important, in attempting to maintain perspective on the problem, to associate these potential effects with quantitative estimates of the probability of their occurrence. Many of the earthquake associated hazards and other physical constraints could result in accidents or situations leading to potential oilspill occurrences as discussed in the following.

Methods:

Spill Frequency Estimates: Statistical distributions for estimating probabilities of oilspill occurrence were taken from Devanney and Stewart (1974) and Stewart (1975-76). In addition to the fundamental assumption that realistic estimates of future spill frequencies can be based on past OCS experience, use of these distributions requires the further specific assumptions that spills occur independently of each other, and that spill rate is dependent on volume of oil produced and handled. Each of these assumptions is open to dispute. The first assumption--that past spill rates are indicative of future spill rates--might be modified either by assuming a decrease in future spill rates because of experience and improved standards, or by assuming an increase in future spill rates because of unknown conditions in new territory. The second assumption--that spills occur independently of each other--might be modified either by assuming a positive correlation (if a spill occurs, conditions are such that more will follow shortly) or by assuming a negative correlation (if a spill occurs, extra precautions are immediately taken). The third assumption--that the spill rate is solely a function of the volume of oil handled--might be modified on the basis of size, extent, frequency, and duration of the handling. This analysis takes the middle ground through these assumptions by using the historic spill rates.

Spill frequency estimates, based on estimated oil resources were calculated separately for various transportation route segments (fig. III.A.1.d.-1), 3 subdivisions (A1, A2, A3) of the proposed lease area (fig. III.A.1.d.-2), and the group (E1) of existing leases (fig. III.A.1.d.-3, data not presented in the draft EIS). Use of the Devanney and Stewart (1974) distributions permitted separate estimates of platform, pipeline, and tanker spill frequencies, which were than combined to estimate the overall risk from producing crude oil and transporting it to shore. The proposed plan is to pipe oil from the leases to Yakutat and ship it south in tankers or use an offshore loading terminal. Three alternatives were also examined, only two of which appear in the FES as Alternatives. (See fig. III.A.1.d.-1 and III.A.1.d.-2.) Alter-

native IV is the same plan, except that subdivision A1 would be deleted from the sale and the same scenarios as the proposal would be used. Both subdivisions A1 and A2 would be deleted in Alternative V and the oil from the remaining leases (A3) would be shipped directly south from a single buoy mooring (SBM) or to Yakutat by pipeline. Since in all cases tanker routes included only departures of oil shipments from the Gulf of Alaska, and not arrival at the port of destination, exposure to tanker spills was halved. Spill frequency estimates (see table III.A.1.d.-1) were made for oilspills greater than 1,000 barrels in size. The size choice is somewhat arbitrary, but as discussed below, it is important in considering the significance of weathering in reducing oilspill impacts.

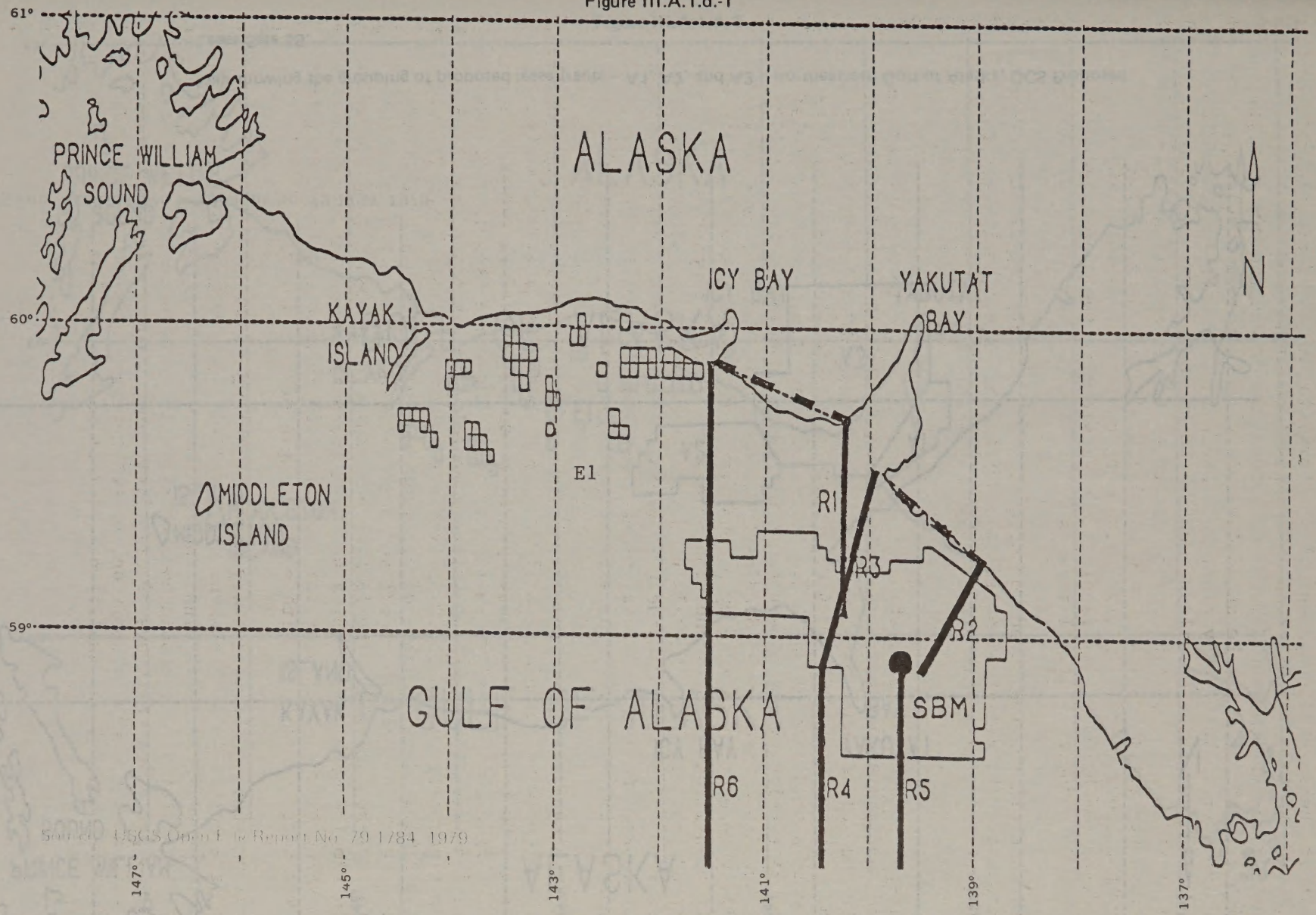
The estimated oil reserves used for oilspill risk calculations in this report match those used by BLM in preparing the draft EIS. Specifically, it is assumed that 450 million barrels (MM bbl) of oil will be produced from the entire area.

Oilspill Trajectory Simulations: An oilspill trajectory model was constructed, and was then used to analyze movement of hypothetical oil slicks on a digital map of the Gulf of Alaska between latitude 58° N to 61°15'N and longitude 135°36' W to 148° W. A coordinate system for this area was established with a grid size of about 2.3 km^2. Representations of the seasonal surface water velocity field were based upon data supplied by Royer (1979), through the BLM Environmental Studies Program. Short-term patterns in wind variability were characterized by probability matrices for successive 3-hour velocity transitions. Forty-one wind velocity states (8 compass directions by 5 windspeed classes, plus the calm condition) were assumed. Wind transition matrices were calculated from the U.S. Weather Service records from the Middleton Island, Alaska, and Sitka, Alaska, weather stations (at least 5 years of continuous records for each) for each of the 4 seasons of the year.

Five hundred hypothetical oilspill trajectories were simulated for each of the 4 seasons from 10 potential oilspill locations in the lease areas, yielding a total of 20,000 trajectories. Each potential spill source was represented as either a single point (e.g., a small portion of the lease area), or as a straight line with the potential spills uniformly distributed along the line (e.g., a transportation route). Surface transport of the oil slick for each spill was simulated as a series of straight-line displacements of a point under the joint influence of local and seasonal winds and currents, on the slick for a 3-hour period. The local wind transition probability matrix was randomly sampled each period for a new wind speed and direction, and the current velocity was updated as the spill changed location. The wind drift factor was taken to be 0.035 with a drift angle of 20° clockwise.

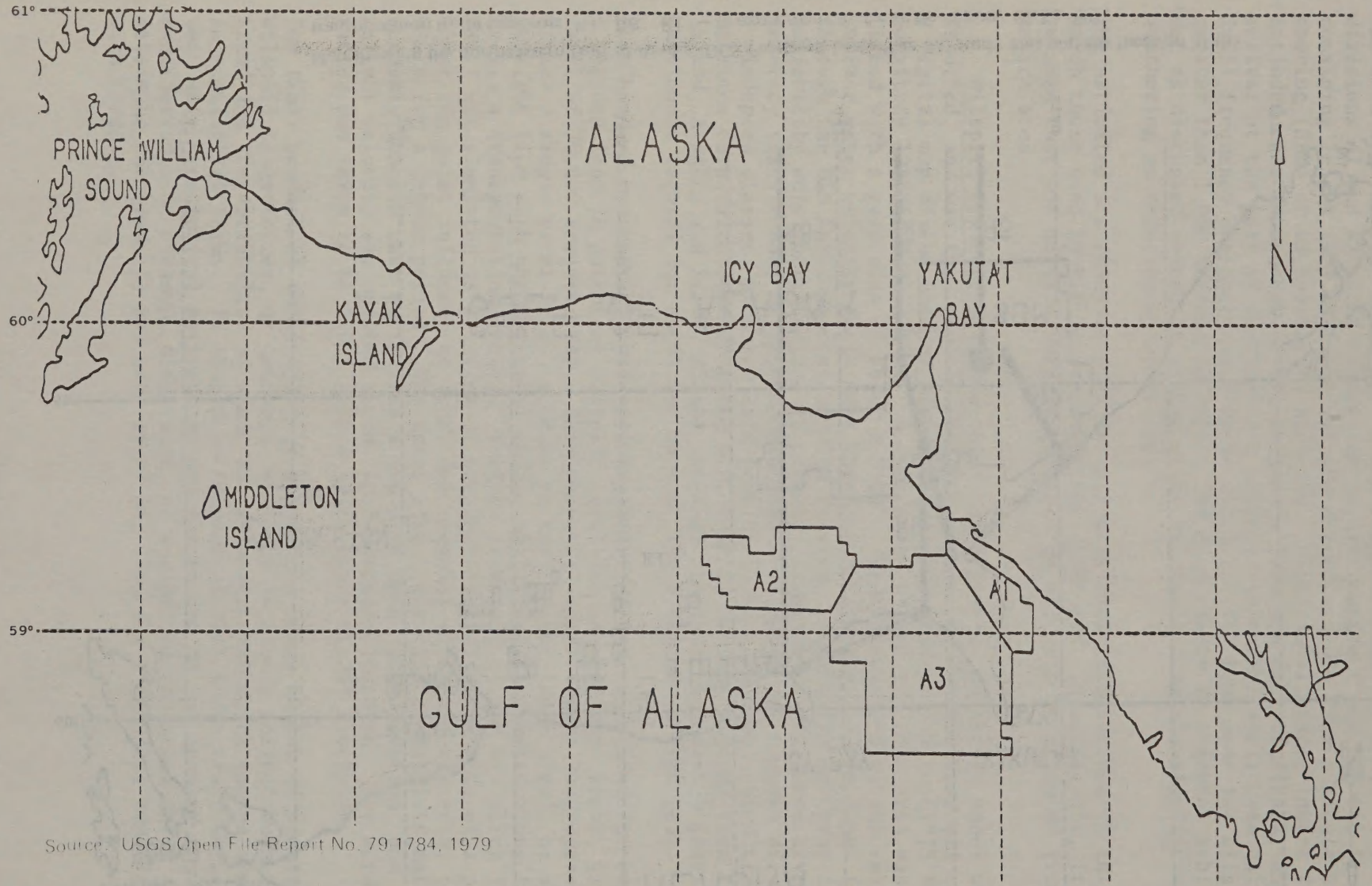
The final product of the trajectory model is a large number of simulated oilspill trajectories, or pathways, which collectively reflect both the general trend and the variability of winds and currents, and which can be summarized in statistical terms. It should be emphasized that these trajectories represent only hypothetical pathways of oil slicks and do not involve any direct consideration of cleanup, dispersion, or weathering processes which would determine the quantity and quality of oil that may eventually come in contact with targets.

Figure III.A.1.d.-1



Map showing the northeastern Gulf of Alaska (OCS Proposed Lease Sale 55) study area and the location of the transportation route segments, R1 - R6. E1 - represents tracts from Sale 39.

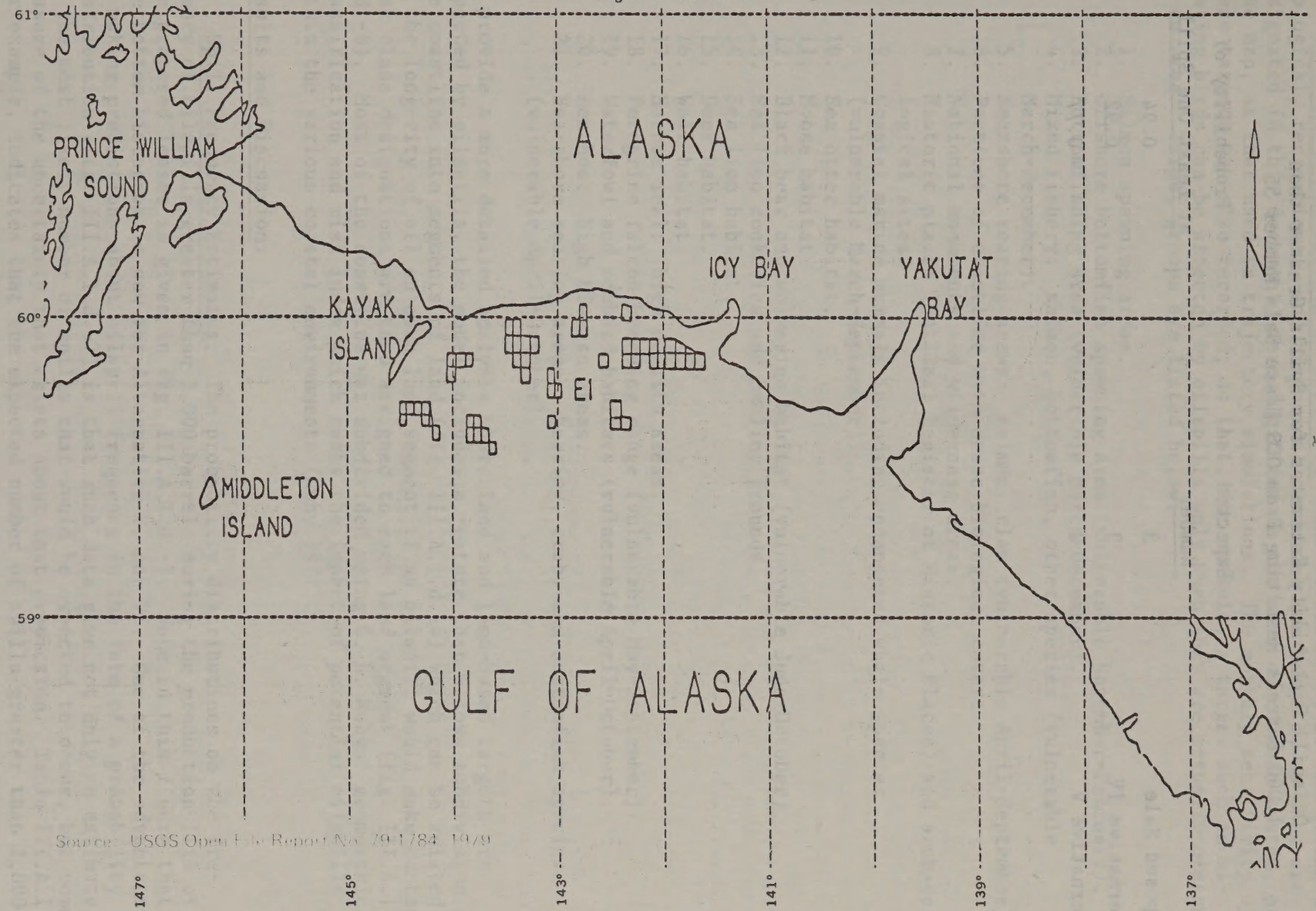
Figure III.A.1.d.-2



Source: USGS Open File Report No. 79-1784, 1979

Map showing the grouping of proposed lease tracts -- A1, A2, and A3 -- northeastern Gulf of Alaska, OCS Proposed Lease Sale 55.

Figure III.A.1.d.-3



Source: USGS Open File Report No. 79-1784, 1979

Map showing the grouping of existing lease tracts -- E1 -- Northern Gulf of Alaska.

Table III.A.1.d.-1

Oilspill Probability Estimates for Spills Greater than 1,000 Barrels Resulting From OCS Lease Sale Number 55

	Expected Number	Probability of at Least One Spill
Proposed Sale	3	0.94
Alternative IV	3	0.92
Alternative V	2	0.77

Locations of Environmental Resources: The locations of 21 categories of biological, recreational, and historical resources (or targets, as they are designated in this document) were digitized in the same coordinate system, or base map, as that used in trajectory simulations. The monthly sensitivity of these targets was also recorded, so that, for example, a target such as migrating birds can be affected by oilspills only when they are actually present in an area. Target groups are listed below:

1. Salmon spawning areas.
2. Offshore bottomfish spawning area (vulnerable November-February).
3. Bottomfishing area (vulnerable March-December).
4. Mixed fishery: salmon, bottomfish, other species (vulnerable March-December).
5. Nearshore rearing areas: salmon, clam (vulnerable April-September).
6. Portions of coastline with dense biological cover.
7. National monuments and wilderness areas.
8. Historic places (National Register of Historic Places) and archaeological sites.
9. Coastal marine mammals including endangered whale species (vulnerable March-September).
10. Sea otter habitat.
11. Moose habitat.
12. Black bear and wolverine habitat (vulnerable June-October).
13. Sea lion rookeries and hauling grounds.
14. Sea lion habitat.
15. Deer habitat.
16. Wolf habitat.
17. Harbor seal: high density areas.
18. Peregrine falcon breeding range (vulnerable May-September).
19. Waterfowl and seabird habitats (vulnerable April-October).
20. Benthos: high biomass areas.
21. Nearshore rearing areas: herring, crab, and bottomfish species (vulnerable April-October).

To provide a more detailed analysis where land and land-based targets are impacted by oilspills, the model includes a feature that allows subdivision of the coastline into segments of land (fig. III.A.1.d.-4) which can be related to the longevity of oil on each land segment if an oilspill would make contact. Risk class designations are then assigned to each land segment (fig. III.A.1.d.-5 and -6). Most of the coastline was subdivided using C. H. Rubys' geomorphic classification and risk index which ranks the impact of potential oilspills within the various coastal environments (Ruby 1977).

Results and Discussion:

Spill Frequency Estimates: The probability distributions on the frequency of oilspills greater than 1,000 barrels during the production life of the proposed leases is given in fig. III.A.1.d.-7. Note in this figure that the bottom histogram is now for Alternative V, not VI. One of the advantages of making predictions about oilspill frequency in the form of a probability distribution (fig. III.A.1.d.-7) is that such data give not only an estimate of the most likely number of spills that would be expected to occur, but some measure of the uncertainty that exists about that prediction. Table III.A.1.d.-1, for example, indicates that the expected number of spills greater than 1,000

barrels from the proposed leases is about 3 spills. From fig. III.A.1.d.-7, the most likely number of spills that will occur (the mode of the distribution) is 2, with a probability of 0.24 that this will be the case; however, there is a 0.18 probability that 1 spill will occur, and a 0.15 probability that 4 spills will occur.

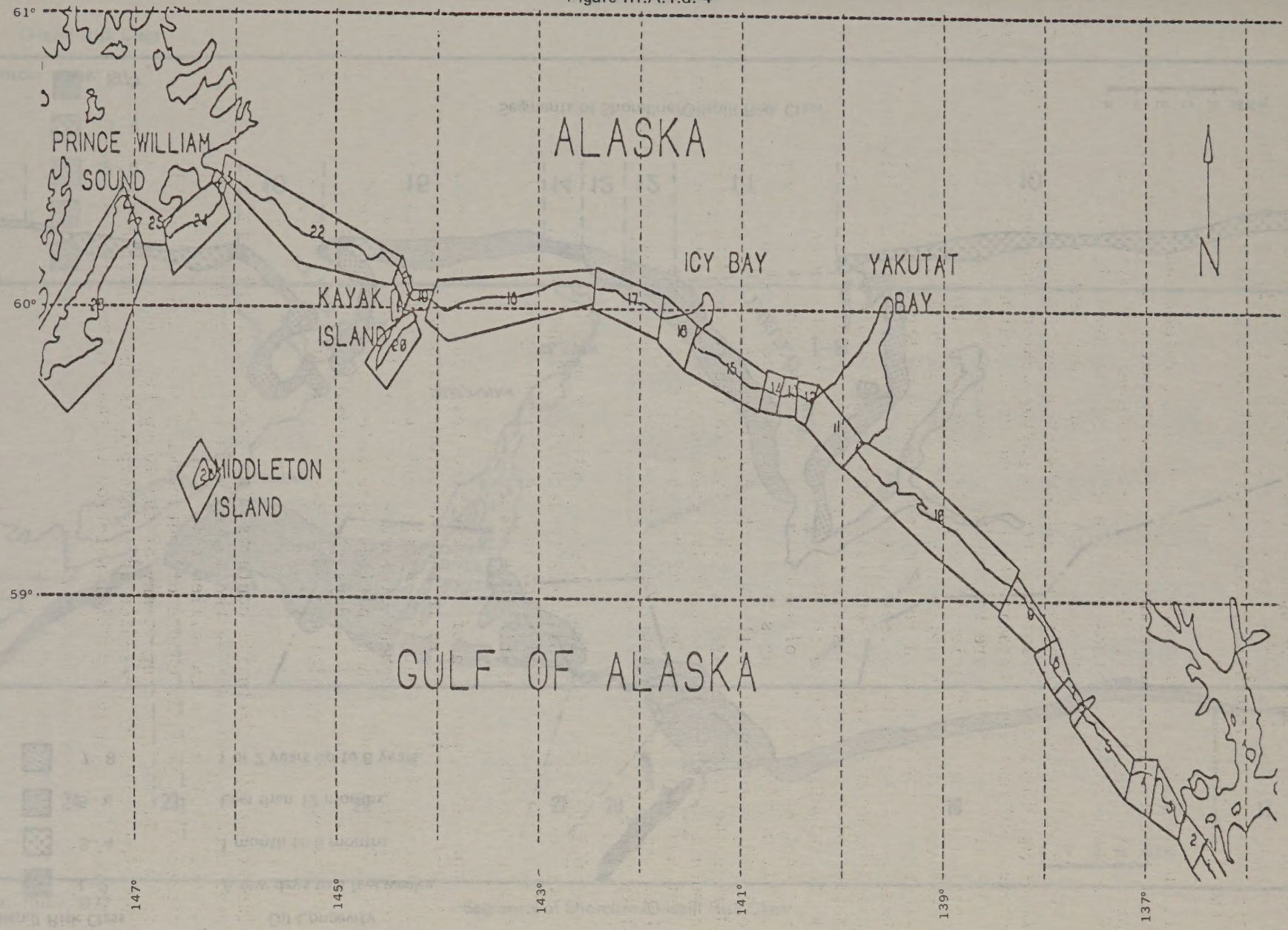
In an assessment of the potential impact of petroleum and toxic metals on the marine environment, the transport and transformation of contaminants is of particular significance. During transportation, contaminants are introduced into the surrounding atmosphere and water column directly by winds and currents. Diffusion, dispersion, advection, and turbulent processes will effect the contaminants' concentration and exposure. Suspended sediments and free-floating biological organisms, such as phytoplankton and zooplankton, are capable of removing contaminants from the water column. During the transport process, contaminants are undergoing continual physical and chemical changes resulting from evaporation of volatile components, flocculation, emulsification, weathering, biodegradation, and chemical decomposition. The significance of weathering in reducing the effects of the oilspill are the time required for a spill to reach a target, the spill size, composition of the oil, the meteorological conditions, and the sea state prevailing during the period of transport. Observations by Jeffery (1973) of actual spills in the North Atlantic indicate the breakup of a slick can be expected within 4 days and that the particles of residual oil typically consist of spongy emulsions of oil of widely varying sizes. A large fraction of the original volume of oil will evaporate into the atmosphere or disseminate into the water column during the first few days. Further loss to the surrounding environment is at a much lower rate. Three days is reported to be sufficient time for evaporation and dissolution of most of the toxic aromatic fractions of crude oil. Less time is required under high wind and sea state conditions (Offshore Oil Task Group, 1973).

Oilspill Trajectories: The trajectory simulation consists of a large number of hypothetical oilspill trajectories (20,000) which collectively reflect both the general trend and the variability of winds and currents which can be described in statistical terms.

The spatial disposition of the simulated trajectories are presented in table III.A.1.d.-2. Each entry in the table represents the probability (expressed as percent chance) that if a spill starts from a certain location, it will reach a particular segment of land within 1 of 3 time limits: 3 days, 10 days, and 30 days. These periods were selected as "milestones" in the life of a spill and represent: 3 days--toxicity greatly reduced; 10 days--containment and cleanup if possible; and 30 days--major spills difficult to locate or track.

The frequency of oilspill contacts with targets were also tabulated. Contacts were recorded only during the months when the target was present and thereby directly vulnerable to spilled oil. Table III.A.1.d.-3 gives the probabilities expressed in percent chance of contact with land, and each of the 21 targets, for a spill originating at any of the 10 spill sites within the study. (Only the 3-day table is presented as an example as this represents a "worst case" tableau and is only a partial solution to the problem of assessing oilspill risks.)

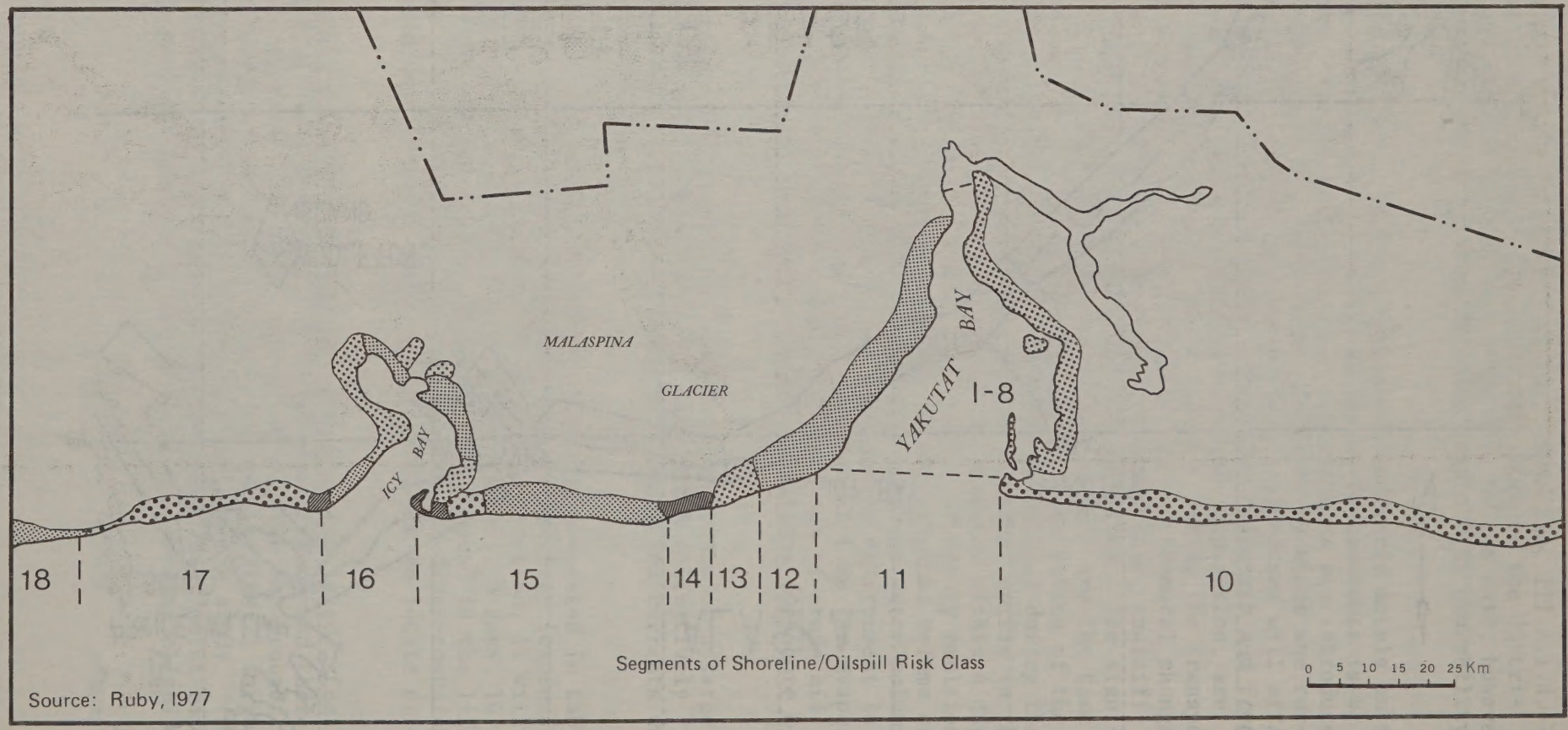
Figure III.A.1.d.-4



Map showing division of the shoreline into varied-length land segments, nort[illegible]astern Gulf of Alaska, OCS Proposed Lease Sale 55.

Figure III.A.1.d.-5

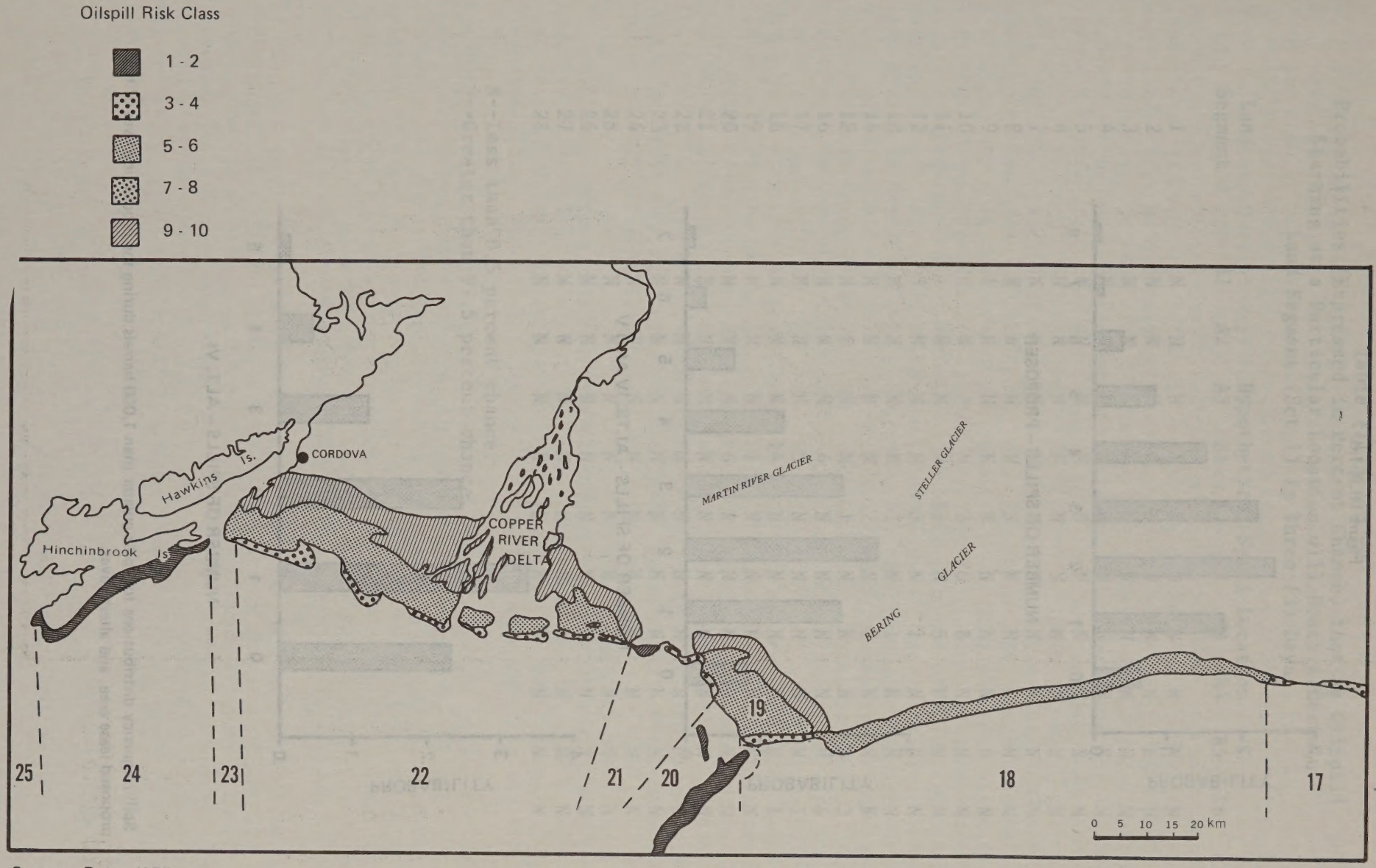
Oilspill Risk Class	Oil Longevity
1 - 2	A few days to a few weeks.
3 - 4	1 month to 6 months.
5 - 6	Less than 12 months.
7 - 8	1 or 2 years up to 8 years.



Segments of Shoreline/Oilspill Risk Class

Source: Ruby, 1977

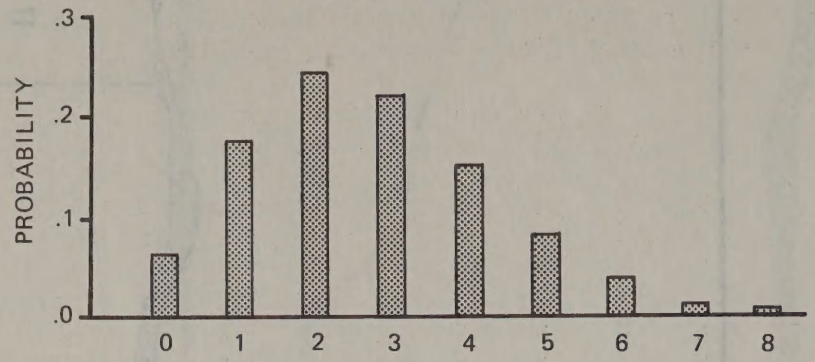
Figure III.A.1.d.-6



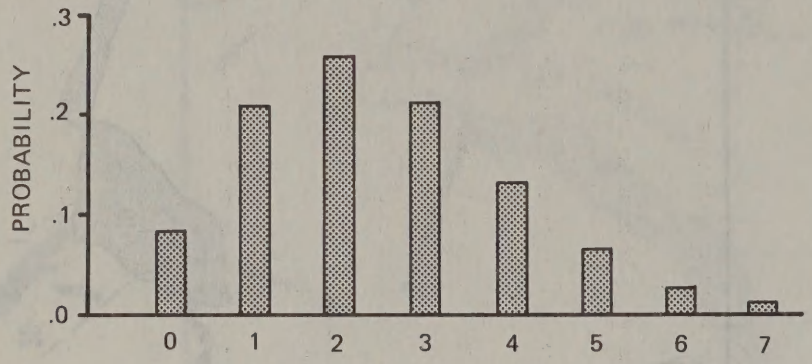
Source: Ruby, 1977

Segments of Shoreline/Oilspill Risk Class

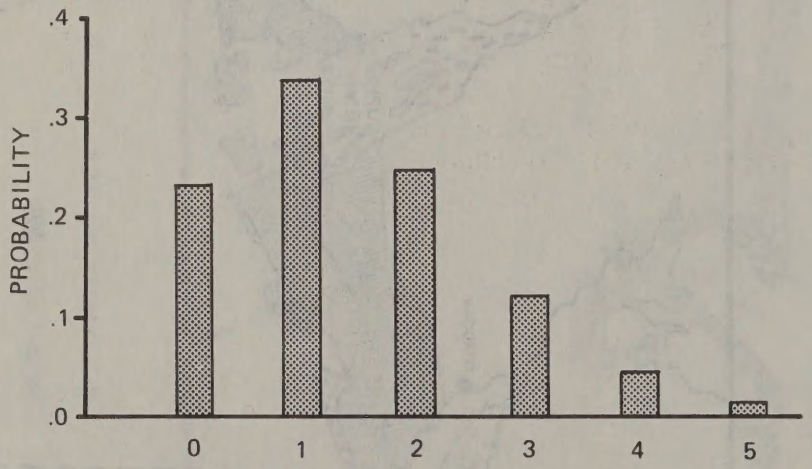
Figure III.A.1.d.-7



NUMBER OF SPILLS -- PROPOSED



NUMBER OF SPILLS -- ALTS. IV AND V



NUMBER OF SPILLS -- ALT. VI

Spill frequency distributions for spills greater than 1,000 barrels during the production lives of the proposed lease area and alternatives.

Table III.A.1.d.-2
Probabilities (Expressed in Percent Chance) that an Oilspill Starting at a Particular Location will Reach a Certain Land Segment (Set 1) in Three (3) Days

Land Segment	Hypothetical Spill Location									
	A1	A2	A3	E1	R1	R2	R3	R4	R5	R6
1	N	N	N	N	N	N	N	N	N	N
2	N	N	N	N	N	N	N	N	N	N
3	N	N	N	N	N	N	N	N	N	N
4	N	N	N	N	N	N	N	N	N	N
5	N	N	N	N	N	N	N	N	N	N
6	N	N	N	N	N	N	N	N	N	N
7	N	N	N	N	N	N	N	N	N	N
8	N	N	N	N	N	N	N	N	N	N
9	1	N	N	N	N	N	N	N	N	N
10	29	N	2	N	3	26	8	N	N	N
11	1	N	N	N	19	N	5	N	N	N
12	N	N	N	N	3	N	1	N	N	N
13	N	N	N	N	3	N	1	N	N	N
14	N	N	N	N	2	N	1	N	N	N
15	N	N	N	N	1	N	N	N	N	3
16	N	N	N	4	N	N	N	N	N	4
17	N	N	N	5	N	N	N	N	N	1
18	N	N	N	14	N	N	N	N	N	1
19	N	N	N	1	N	N	N	N	N	N
20	N	N	N	6	N	N	N	N	N	N
21	N	N	N	N	N	N	N	N	N	N
22	N	N	N	N	N	N	N	N	N	N
23	N	N	N	N	N	N	N	N	N	N
24	N	N	N	N	N	N	N	N	N	N
25	N	N	N	N	N	N	N	N	N	N
26	N	N	N	N	N	N	N	N	N	N
27	N	N	N	N	N	N	N	N	N	N
28	N	N	N	N	N	N	N	N	N	N

N--Less than 0.5 percent chance.
*--Greater than 99.5 percent chance.

Table III.A.1.d.-3
Probabilities (Expressed in Percent Chance) that an Oilspill Starting at a Particular Location will Reach A Certain Target in Three (3) Days

Target	Hypothetical Spill Location								
	A1	A2	A3	E1	R1	R2	R3	R4	R5
Land	31	N	3	31	31	27	16	N	N
Salmon Spawning Area	53	1	7	28	41	41	23	N	N
Offshore Bottomfish Area	4	30	17	N	16	6	21	8	10
Bottomfishing Area	17	N	74	N	5	48	10	5	42
Salmon, Bottomfish, etc.	81	N	22	N	2	55	4	N	N
Rearing: Salmon, Clam	32	N	3	2	16	22	9	N	N
Dense Biological Cover	N	N	N	9	9	N	3	N	N
National Monument/Wilderness	42	N	4	6	33	36	13	N	N
Nat. Reg. Hist. Pl./Arch.	24	N	4	N	7	18	17	N	N
Coastal Marine Mammals	53	1	6	25	27	32	19	N	N
Sea Otter Habitat	97	5	27	*	50	72	34	N	1
Moose Habitat	19	N	2	7	27	28	5	N	N
Black Bear/Wolverine Habitat	30	N	3	5	17	20	10	N	N
Sea Lion Rookery/Haul. Gnds.	3	N	N	4	4	N	1	N	N
Sea Lion Habitat	89	4	15	49	63	57	41	N	N
Deer Habitat	15	1	6	N	9	6	29	N	N
Wolf Habitat	53	N	5	6	36	42	20	N	N
Harbor Seal High Density	32	N	4	15	24	33	10	N	N
Peregrine Falcon Breed. Range	27	N	3	12	15	18	10	N	N
Waterfowl/Seabirds	34	N	3	N	22	25	10	N	N
Benthos: High Biomass	7	14	6	4	17	3	34	N	N
Rearing: Herring, Crab, Bottomfish	36	N	4	2	23	26	13	N	N

N--Less than 0.5 percent chance.
*--Greater than 99.5 percent chance.

Combined Analysis--Spill Frequency Estimates and Oilspill Trajectories: It is worthwhile to briefly summarize some of the important points to be drawn from the results presented thus far. Data in table III.A.1.d.-1 indicates that the proposed leasing is expected to result in 2.8 spills exceeding 1,000 barrels. Furthermore, consideration of travel time to contact (tables III.A.1.d.-2 and III.A.1.d.-3), evaporation rates, and rates of slick dispersion lead to the conclusion that except in the immediate vicinity of its release, an individual spill would need to be as large as 1,000 barrels in size in order to have significant ecological effect. The probabilities in tables III.A.1.d.-2 and III.A.1.d.-3 give the chances that if a spill occurs in the lease area, it would contact a target or land segment within the allotted time.

With respect to the hazard of major spills (i.e., greater than 1,000 barrels), the data presented in tables III.A.1.d.-2 and III.A.1.d.-3 represent only a partial solution to the problem of assessing oilspill risks to important resources. The overall oilspill risk posed by oil and gas production in the proposed sale area must be assessed as a joint function of the probability that spills will occur in the course of development, as well as the likelihood that spills will follow certain trajectories. Thus, the data in tables III.A.1.d.-2 and III.A.1.d.-3 must be combined with the spill frequency estimates presented in fig. III.A.1.d.-7 to obtain a total probability distribution for contacts with individual targets and land segments.

Despite the intuitive logic of simply multiplying the probabilities in fig. III.A.1.d.-7 and in tables III.A.1.d.-2 and III.A.1.d.-3, the correct computation of the overall or "total" probability is in fact somewhat more complicated. This results from the fact that the probabilities presented in tables III.A.1.d.-2 and III.A.1.d.-3 are actually conditional probabilities and refer to the probabilities of contact on resources "conditioned" on the chance of spills occurring in the first place.

The resulting overall probabilities of a target being contacted one or more times by an oilspill, as well as the most likely number of contacts, are presented in tables III.A.1.d.-4 through III.A.1.d.-7. Similar numbers for land segments are presented in tables III.A.1.d.-8 through III.A.1.d.-11.

Conclusions: Tables III.A.1.d.-8 through III.A.1.d.-11 are useful for identifying those areas of shoreline most likely to be affected by oilspills. Virtually all risks of oilspills less than 3 days old contacting land occur in segments A-10 and A-11 (Dry Bay to Point Manby); these would be the only segments likely to suffer acutely toxic effects from oilspills. Examination of 30-day contacts show that sale 55 is unlikely to result in oilspills contacting the coastline east of Cape Fairweather or west of Kayak Island.

It can be seen from tables III.A.1.d.-4 through III.A.1.d.-7 that the alternatives distribute risks differently. Alternative V shows the advantages of keeping the oil at sea in that risks to coastal targets are lower, but it increases the risks to some fisheries. All these alternatives and the proposed action are subject to the effects of large magnitude earthquakes which may result in a series of events conducive to the oilspill risks as previously described.

Cumulative Effects: Because 2 to 3 oilspills of a major significance have been predicted by the preceding analysis, and because the resulting probabilities of impacting various resources are a result of these multiple potential spills; the entire oilspill risk analysis has built into it an implicit quantitative estimate of the cumulative effects of a given resource being impacted not only more than once but from more than one source or type of spill, i.e., platform, pipelines, terminals, and tankers.

e. Constraints on Oil and Gas Development: A variety of potential geological, oceanographic, and meteorological hazards could affect potential oil and gas development activities. Such potential hazards may limit particular site selections for onshore or offshore facilities, in addition to the development of special engineering designs of facilities and operational precautions to meet the environmental conditions according to OCS Order No. 8.

The following describes how the more significant potential natural hazards could affect OCS development.

Seismicity and Earthquake Associated Hazards: The environmental geology graphic (Graphic No. 1) both displays and describes a number of aspects of large magnitude earthquakes and their effects adjacent to the proposed lease area.

Clearly, the most significant constraint of earthquakes on potential OCS development is that both onshore and offshore facilities should be designed and engineered to withstand nearby large magnitude (greater than 6.5) earthquakes without significantly endangering operating personnel, local inhabitants, or the general ecological environment. Failure of an offshore production platform or rupture of a pipeline due to seismically induced slumping or foundation failure could lead to a potential oilspill in the marine environment.

Industry has been attempting to install earthquake-proof platforms. Exxon recently installed an 850-ft production platform in the Santa Barbara Channel. It was designed to withstand horizontal ground accelerations of 500 cm^2/sec.

The February 28, 1979, 7.7 earthquake which occurred northwest of the Malaspina Glacier (see Environmental Geology Graphic No. 1) generated a ground acceleration of .07 g at Yakutat. Site-specific soil conditions and water depth will significantly affect the response of offshore facilities to earthquake ground shaking and seismic vibrations.

In the event of structural failure of an offshore production and storage facility, the lives of personnel onboard would be endangered. Severe financial losses may occur. Oilspills could occur depending on the nature of damage to pipes, wellhead facilities, feeder pipelines, and storage facilities.

Production wells are required to have subsea safety valve devices which could shut off flow from the wells in the event of an emergency such as an earthquake.

According to a very recent report by Thenhaus, et al (1979), the proposed sale 55 lease area occurs in their seismogenic zone No. 13 on the Outer Continental Shelf in the eastern Gulf of Alaska. Thenhaus, et al (1979) have shown that sale 55's proposed lease area occurs in a zone where the ground acceleration

Table III. A.1.d.-4
Probabilities (in Percent) of One or More Spills and the Most Likely Number of Spills Greater than 1,000 Barrels Occurring and Contacting Targets over the Production Life of the Lease Area
(Proposed Action--Alternative I)

Target	Within 3 Days		Within 10 Days		Within 30 Days	
	Prob. (1 or more)	Mode	Prob. (1 or more)	Mode	Prob. (1 or more)	Mode
Land	31	0	60	0	84	1
Salmon Spawning Area	44	0	67	1	84	1
Off. Bottomfishing Area	27	0	39	0	42	0
Bottomfishing Area	66	1	69	1	71	1
Salmon, Bottomfish. etc.	54	0	62	0	66	1
Rearing: Salmon, Clam	26	0	42	0	53	0
Dense Biological Cover	2	0	10	0	27	0
Natl. Monument/Wilderness	38	0	62	0	77	1
Natl. Register Hist. Pl/Arch.	25	0	43	0	53	0
Coastal Marine Mammals	37	0	55	0	71	1
Sea Otter Habitat	67	1	79	1	89	2
Moose Habitat	28	0	46	0	64	1
Black Bear, Wolverine Habitat	25	0	43	0	59	0
Sea Lion Rookery/Hauling Gnd.	1	0	10	0	27	0
Sea Lion Habitat	60	0	76	0	86	2
Deer Habitat	20	0	36	0	44	0
Wolf Habitat	44	0	65	1	77	1
Harbor Seal High Density	34	0	52	0	67	1
P. Falcon Breeding Range	23	0	40	0	60	0
Waterfowl/Seabirds	28	0	48	0	65	0
Benthos: High Biomass	19	0	44	0	59	0
Rearing: Herring, Crab, Bottomfish	30	0	47	0	59	0

Notes: Prob. is the probability (in percent) of one or more spills contacting the target.
Mode is the most likely number of contacts.
N is less than 0.5 percent.

Table III.A.1.d.-5
Probabilities (in Percent) of One or More Spills and the Most Likely Number of Spills Greater than 1,000 Barrels Occurring and Contacting Targets Over the Production Life of the Lease Area
(Alternative IV)

Target	Within 3 Days		Within 10 Days		Within 30 Days	
	Prob. (1 or more)	Mode	Prob. (1 or more)	Mode	Prob. (1 or more)	Mode
Land	27	0	55	0	81	1
Salmon Spawning Area	39	0	62	0	81	1
Off. Bottomfishing Area	26	0	36	0	40	0
Bottomfishing Area	63	1	67	1	68	1
Salmon, Bottomfish, etc.	48	0	57	0	61	0
Rearing: Salmon, Clam	22	0	37	0	49	0
Dense Biological Cover	1	0	9	0	25	0
Natl. Monument/Wilderness	33	0	56	0	73	1
Natl. Register Hist. Pl/Arch.	22	0	39	0	48	0
Coastal Marine Mammals	32	0	50	0	67	1
Sea Otter Habitat	61	0	74	1	86	1
Moose Habitat	24	0	41	0	60	0
Black Bear, Wolverine Habitat	21	0	38	0	54	0
Sea Lion Rookery/Hauling Gnd.	1	0	9	0	24	0
Sea Lion Habitat	53	0	71	1	83	1
Deer Habitat	17	0	32	0	41	0
Wolf Habitat	38	0	59	0	73	1
Harbor Seal High Density	30	0	47	0	62	0
P. Falcon Breeding Range	19	0	36	0	56	0
Waterfowl/Seabirds	24	0	44	0	60	0
Benthos: High Biomass	17	0	41	0	55	0
Rearing: Herring, Crab, Bottomfish	26	0	42	0	55	0

Notes: Prob. is the probability (in percent) of one or more spills contacting the target.
Mode is the most likely number of contacts.
N is less than 0.5 percent.

Table III.A.1.d.-6
Probabilities (in Percent) of One or More Spills and the Most Likely Number of Spills Greater than 1,000 Barrels Occurring and Contacting Targets over the Production Life of the Lease Area
(Deletion of AI with a pipeline to Icy Bay)*

Target	Within 3 Days		Within 10 Days		Within 30 Days	
	Prob. (1 or More)	Mode	Prob. (1 or More)	Mode	Prob. (1 or More)	Mode
Land	31	0	59	0	82	1
Salmon Spawning Area	40	0	63	0	80	1
Off. Bottomfishing Area	29	0	34	0	36	0
Bottomfishing Area	43	0	45	0	46	0
Salmon, Bottomfish, etc.	15	0	24	0	29	0
Rearing: Salmon, Clam	16	0	27	0	38	0
Dense Biological Cover	9	0	20	0	36	0
Natl. Monument/Wilderness	33	0	55	0	70	1
Natl. Register Hist. Pl/Arch.	8	0	22	0	30	0
Coastal Marine Mammals	30	0	48	0	65	1
Sea Otter Habitat	56	0	74	1	86	1
Moose Habitat	26	0	44	0	60	0
Black Bear, Wolverine Habitat	21	0	38	0	51	0
Sea Lion Rookery/Hauling Gnd.	5	0	16	0	30	0
Sea Lion Habitat	57	0	72	1	83	1
Deer Habitat	12	0	23	0	29	0
Wolf Habitat	33	0	54	0	67	1
Harbor Seal High Density	22	0	38	0	54	0
P. Falcon Breeding Range	18	0	36	0	54	0
Waterfowl/Seabirds	22	0	41	0	55	0
Benthos: High Biomass	23	0	44	0	55	0
Rearing: Herring, Crab, Bottomfish	21	0	34	0	46	0

Notes: Prob. is the probability (in percent) of one or more spills contacting the target.
Mode is the most likely number of contacts.
N is less than 0.5 percent.
* This particular scenario option was deleted in the FEIS.

Table III.A.1.d.-7
Probabilities (in Percent) of One or More Spills and the Most Likely Number of Spills Greater than 1,000 Barrels Occurring and Contacting Targets over the Production Life of the Lease Area
(Alternative V)

Target	Within 3 Days		Within 10 Days		Within 30 Days	
	Prob. (1 or More)	Mode	Prob. (1 or More)	Mode	Prob. (1 or More)	Mode
Land	2	0	16	0	51	0
Salmon Spawning Area	4	0	21	0	51	0
Off. Bottomfishing Area	17	0	25	0	28	0
Bottomfishing Area	56	0	60	0	62	0
Salmon, Bottomfish, etc.	14	0	25	0	33	0
Rearing: Salmon, Clam	2	0	10	0	25	0
Dense Biological Cover	N	0	3	0	14	0
Natl. Monument/Wilderness	3	0	17	0	42	0
Natl. Register Hist. Pl/Arch.	3	0	11	0	23	0
Coastal Marine Mammals	4	0	17	0	41	0
Sea Otter Habitat	17	0	35	0	61	0
Moose Habitat	1	0	9	0	29	0
Black Bear, Wolverine Habitat	2	0	12	0	32	0
Sea Lion Rookery/Hauling Gnd.	N	0	3	0	14	0
Sea Lion Habitat	10	0	30	0	56	0
Deer Habitat	4	0	12	0	31	0
Wolf Habitat	4	0	19	0	42	0
Harbor Seal High Density	2	0	12	0	30	0
P. Falcon Breeding Range	2	0	11	0	32	0
Waterfowl/Seabirds	2	0	13	0	34	0
Benthos: High Biomass	4	0	17	0	34	0
Rearing: Herring, Crab, Bottomfish	2	0	13	0	30	0

Notes: Prob. is the probability (in percent) of one or more spills contacting the target.
Mode is the most likely number of contacts.
N is less than 0.5 percent.

Table III.A.1.d.-8
Probabilities (in Percent) of One or More Spills and the Most Likely Number of Spills Greater than 1,000 Barrels Occurring and Contacting Land Segments over the Production Life of the Lease Area
(Proposed Action--Alternative I)

Land Segment	Within 3 Days Prob. (1 or More)	Within 10 Days Prob. (1 or More)	Within 30 Days Prob. (1 or More)
A- 9	N	1	2
A-10	28	49	58
A-11	2	8	15
A-12	N	2	4
A-13	N	3	6
A-14	N	3	7
A-15	N	6	18
A-16	N	1	4
A-17	N	1	8
A-18	N	1	19
A-19	N	N	1
A-20	N	N	5
A-26	N	N	1
A-27	N	N	N
A-28	N	N	1

Table III.A.1.d.-9
Probabilities (in Percent) of One or More Spills and the Most Likely Number of Spills Greater than 1,000 Barrels Occurring and Contacting Land Segments over the Production Life of the Lease Area
(Alternative IV)

Land Segment	Within 3 Days Prob. (1 or More)	Within 10 Days Prob. (1 or More)	Within 30 Days Prob. (1 or More)
A- 9	N	1	2
A-10	24	44	53
A-11	2	7	14
A-12	N	2	3
A-13	N	2	5
A-14	N	3	6
A-15	N	5	17
A-16	N	1	4
A-17	N	1	8
A-18	N	1	18
A-19	N	N	1
A-20	N	N	5
A-26	N	N	1
A-28	N	N	1

Notes: Prob. is the probability (in percent) of one or more spills contacting the segment.
Mode is the most likely number of contacts, and is zero for all of the above.
N is less than 0.5 percent.
Only those land segments with probabilities greater than 0.5 percent have been included in these tables.

Table III.A.1.d.-10
Probabilities (in Percent) of One or More Spills and the Most Likely Number of Spills Greater than 1,000 Barrels Occurring and Contacting Land Segments over the Production Life of the Lease Area (Deletion of AI and pipeline to Icy Bay)*

Land Segment	Within 3 Days Prob. (1 or More)	Within 10 Days Prob. (1 or More)	Within 30 Days Prob. (1 or More)
A- 9	N	N	1
A-10	4	17	25
A-11	16	22	26
A-12	3	5	6
A-13	3	6	8
A-14	2	5	8
A-15	3	13	22
A-16	3	5	9
A-17	1	5	11
A-18	N	6	24
A-19	N	N	1
A-20	N	N	9
A-22	N	N	1
A-24	N	N	1
A-26	N	N	1
A-28	N	N	1

* Note: This particular scenario option was deleted in the FEIS.

Table III.A.1.d.-11
Probabilities (in Percent) of One or More Spills and the Most Likely Number of Spills Greater than 1,000 Barrels Occurring and Contacting Land Segments over the Production Life of the Lease Area (Alternative V)

Land Segment	Within 3 Days Prob. (1 or More)	Within 10 Days Prob. (1 or More)	Within 30 Days Prob. (1 or More)
A- 8	N	N	1
A- 9	N	N	1
A-10	2	11	23
A-11	N	2	7
A-12	N	1	1
A-13	N	1	3
A-14	N	1	3
A-15	N	2	8
A-16	N	N	2
A-17	N	N	4
A-18	N	N	10
A-20	N	N	3

Notes: Prob. is the probability (in percent) of one or more spills contacting the segment.
Mode is the most likely number of contacts, and is zero for all of the above.
N is less than 0.5 percent.
Only those land segments with probabilities greater than 0.5 percent have been included in these tables.

ranges from 20-40 percent of gravitational acceleration for those earthquakes with a 500-year return period.

It is suggested that both onshore and offshore bottom-founded oil and gas facilities be designed to withstand, at a minimum, the ground accelerations predicted for seismogenic zone No. 13 of Thenhaus, et al; (1979).

Mass Movement: During some earthquakes, fine well-sorted sandy or silty soils, especially water-saturated soils, will probably liquify, lose bearing strength, and tend to slide or slump downslope. Onshore, landslides or mud-flows could result and thereby threaten onshore development facilities, should they be located in the pathway.

The same potential danger exists offshore for submarine slumps and potentially hazardous site conditions for offshore facilities. There are several potential slump areas that have been mapped in and adjacent to the proposed lease area (see Environmental Geology Graphic).

Although no landslides occurred in the Yakutat area after the February 28, 1979, 7.7 earthquake, the possibility of future landslides occurring still exists, particularly if the epicenter of a large magnitude earthquake were in or adjacent to the proposed lease area.

Tsunamis: Both local and regional tsunamis can be generated as a function of earthquake-induced submarine mass movements or tilting of the sea floor. Such tsunamis have the unqualified potential to severely threaten the physical existence of coastal communities and OCS development facilities, especially at elevations under 30 m above sea level.

The seismic sea wave warning system was established in 1948 by the U.S. Coast and Geodetic Survey. Advance notices of tsunamis are issued throughout Pacific coastal areas. Improved earthquake and tsunami warning systems have been installed in Alaska since 1964 to provide better and faster warnings to threatened coastal areas.

Tsunamis represent a significant danger to onshore oil storage tank facilities located at elevations less than 30 m above sea level. Tsunamis can potentially rupture such tanks, as well as overturn or severely damage oil tankers in ports.

Faulting: Faults represent moderate levels of hazards to offshore drilling. The environmental geology graphic (Graphic No. 1) shows the locations of shallow, near-surface faults which have been identified in and adjacent to the proposed lease area. If shallow, gas-charged sediments are associated with shallow faults, then there indeed exists some potential for a shallow gas blowout.

In addition, if high abnormal formation pressures should be encountered at producing horizons and a serious oil blowout occurs similar to the Santa Barbara blowout, then shallow near-surface faults could prove to be potential hazards for oil and gas to reach the sea floor outside the well casing. This would represent a worst case scenario for a blowout. Blowouts occurring inside the well casing have a much better chance of being brought under control more rapidly.

Faults and their movement during earthquakes also pose some problems for sea floor completion facilities and pipelines. Pipelines could be ruptured if much displacement occurred along a fault crossing a pipeline route.

Conclusions: Table III.A.1.e.-1 summarizes the relative degree of constraint on proposed and alternative types of oil and gas operations by the more hazardous aspects of the environment of the proposed lease area.

The most significant design constraint on development is the effect of large magnitude earthquakes and a host of potential seismically-induced hazards such as ground shaking, mass movement, faulting, and tsunamis.

Potential committed mitigation for these potential hazards exists under OCS Operating Order No. 8, which requires that the design of offshore facilities comply with USGS standards.

Cumulative Effects: The cumulative effect of potentially recurring earthquakes in close proximity to oil and gas facilities, either at Yakutat or offshore, could result in repeated occurrences of severe damage to such facilities. Repetitious, severe earthquakes over the life of the project could result in significant losses to physical facilities, human resources, and the local lifestyle and economy.

Unavoidable Adverse Effects: Despite all potential mitigation in terms of design engineering and facility site selection, it is entirely possible that a very large magnitude earthquake close to the city of Yakutat, or any other onshore development area as well as an attendant potential tsunami, could still cause very serious physical damage to established coastal communities and facilities.

Table III.A.1.e.-1

Gulf of Alaska #55

Estimated Physical Constraints on Oil and Gas Development

ENVIRONMENTAL FACTORS	OFFSHORE EXPLORATION			OFFSHORE DEVELOPMENT				ONSHORE DEVELOPMENT				
	Semi-submersibles	Drillships	Jack-Ups	Bottom-founded Platforms	Production Platforms	Submarine Pipelines	Pipelines	Oil Terminal	Support and Supply Base	LNG Plant	Gas Pipeline
Earthquake Magnitude	L	L	H	H	H	H	H	H	H	H	H
Ground Shaking or Breaking	L	L	H	H	H	H	H	H	M	H	H
Mass Movement (slumping, landslides, mudflows, liquefaction of soils, and avalanches	L	L	H	H	H	H	H	H	M	H	H
Faulting	L	L	H	L	M	M	M	L	L	L	M
Gas-Charged Sediments	M	M	M	M	L	L	L	M	L	L	L
Tsunamis	L	L	H	L	L	L	L	L	H	H	L
Storm Waves	L	L	M	L	M	L	L	L	L	L	L
Sediment Transport and Seabed Bedforms	L	L	M	M	M	M-H	L	L	L	L	L
High Abnormal Formation Pressures	M-H	M-H	M-H	M-H	M-H	L	L	L	L	L	L
Coastal Erosion	L	L	L	L	L	M	M	L	M	L	L

Note: The H (high), M (medium), and L (low) designations are based on a combined assessment of (1) the severity of potential environmental hazards to oil and gas operations, (2) the availability of technical information necessary as a prerequisite to either development or implementation of appropriate offshore technological systems, and (3) the extent of the relative availability of present and future technology in response to potential natural hazards.

2. Alternative I - Proposed Action: Final regulations concerning environmental impact statements by the Council on Environmental Quality have emphasized that only those issues and impacts which have major significance in light of the scoping process and the environmental assessment process be discussed in detail in an impact statement. The following section on environmental consequences has been presented in terms of only those issues and impacts determined to have major significance or degrees of impact. Figure I.C.-1. and results of the scoping process as shown in sec. V have shown a complete array of key scoping issues and impacts, and their relative degree of significance for each alternative. Those issues and impacts which were not determined, either during the scoping process or the environmental assessment process, to be of major significance have not been discussed in detail in this section.

The environmental assessment, in terms of relative severity of the impacts on many of the less important issues, has previously been summarized in fig. I.C.-1. The summary lists of probable impacts under each alternative is described in sec. I.

The major or highly significant environmental issues discussed in this section include:

1. Impacts on the maintenance of Yakutat's lifestyle
2. Impacts on the local economy of Yakutat
3. Impacts on fisheries resources
4. Impacts on endangered and threatened species
5. Impacts on cultural and historic resources
6. Impacts on water quality
7. Impacts on air quality

The impact on these issues of the proposal and its alternatives have been analyzed with the following information: the preceding consideration of the basic assumptions for impact analysis, results of the USGS oilspill trajectory analysis (1979), the environmental constraints on oil and gas development, and the determination of those impacts of major significance as a result of the scoping and environmental assessment processes. All of the above provide a setting for the following discussions on environmental consequences of the proposal (as fig. III.A.2.-1 shows) and its alternatives. The above issues of significant environmental concern have been denoted throughout this section with an asterisk to indicate that special emphasis has been placed on these impacts.

a. Impacts on the Biological Characteristics of the Affected Environment

Impacts on Marine Habitats and Food Web Resources: This section describes and quantifies the impacts on the pelagic, benthic, and littoral and nearshore habitats. The pelagic habitat contains icthyoplanktonic, phytoplanktonic, and zooplanktonic organisms, as mentioned in sec. II.B.1. These organisms are important, partly because they include larval stages of, and food resources for, finfish and shellfish that are harvested for commercial, sport, and subsistence uses.

Pelagic Habitat: The pelagic habitat may be impacted by drilling muds. The magnitude of the impact of drilling muds on pelagic organisms in Cook Inlet has been shown to be negligible. Also, drilling muds have been discharged with no impact into the northeastern Gulf of Alaska during the drilling of the 11 "dry" holes in the past few years. No impact is expected on the pelagic habitat in the eastern Gulf of Alaska due to discharge of drilling muds.

The pelagic habitat may also be impacted by hydrocarbons from major oilspills, formation waters, and discharges from onshore oil-handling facilities. As a result of sale 39 in the northern Gulf of Alaska, there were no impacts on the pelagic habitat due to hydrocarbons, but no oil was discovered and produced that could be spilled. In the eastern Gulf of Alaska, the petroleum is expected to be primarily in the form of gas. Gas blowouts should have only a very temporary and local effect on the marine environment because of the rapid rate at which the gas would volatilize into the atmosphere.

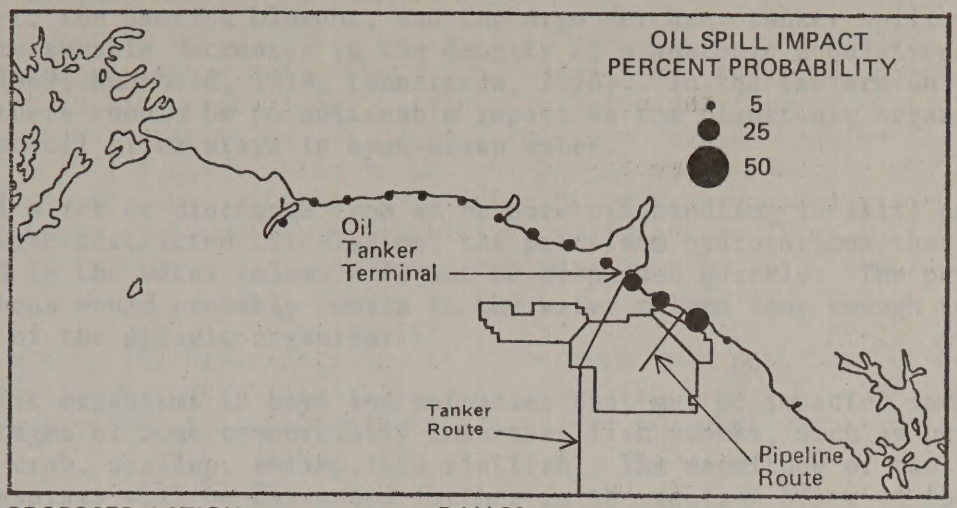
Formation waters are expected to be produced at a ratio of about 1:1 with oil. This means a total of only about 450 million barrels, or about 1/15 mi^3 would be discharged over a 25-year period.

Major oilspills will probably cause the largest impact; spills may originate both from blowouts and from statistically more hazardous tanker accidents. In the eastern Gulf of Alaska this might involve less than a yearly average of 1,500 barrels of oil from blowouts and 45,000 barrels from tanker accidents.

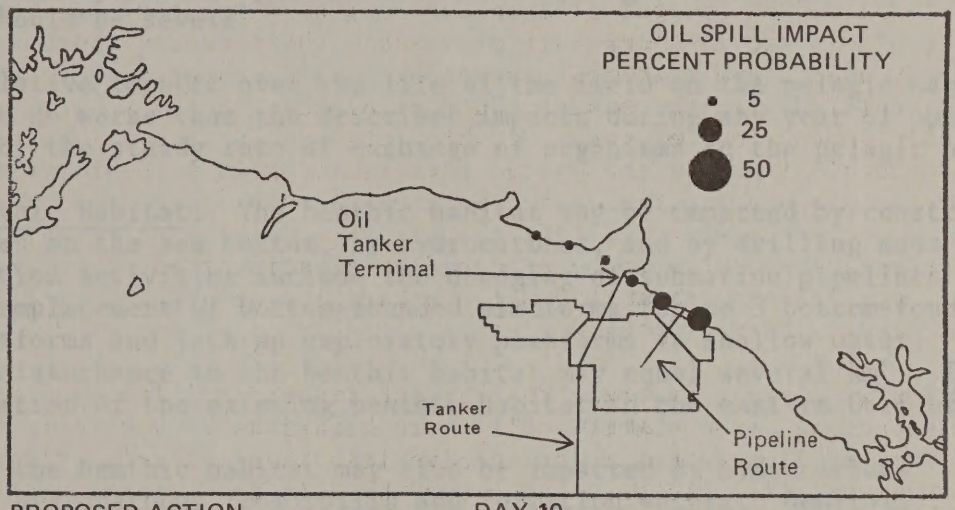
The aromatic compounds in spilled oil are the most toxic component and dissolve easily into the water column. These compounds are probably quite toxic to pelagic organisms that are immediately below or within any oil slick. Aromatic compounds also evaporate into the air very rapidly. The rapid rate of volatilization of aromatic compounds means that oil in the form of a slick on the water surface remains toxic to organisms for only about 1 week.

Within 1 week, a slick from a small blowout (about 1,500 barrels) might spread to cover up to 10 sq km; a slick from a major spill, such as a tanker accident, might cover up to 100 sq km. After 1 week, an oil slick in the open ocean would probably disperse into small oil droplets in the water column, as found around the wreck of a tanker in Chedabucto Bay, Nova Scotia. These small oil droplets, and any other hydrocarbons discharged into the water column such as formation waters, would probably be dispersed to the northwest along the Alaskan coast (see sec. II.A.2). The short longevity and relatively small size (compared to the whole Gulf of Alaska) of an oil slick in the open ocean means that a slick should not have a large impact on the pelagic organisms.

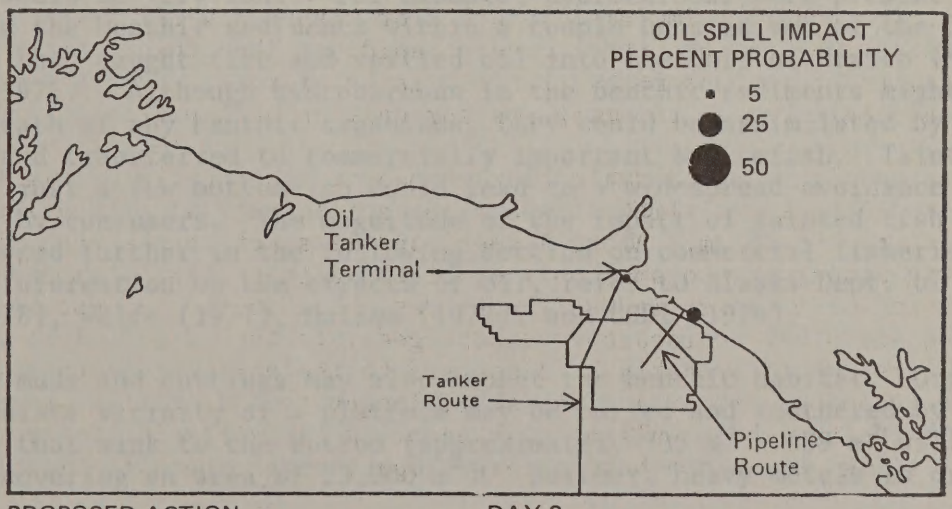
Figure III. A. 2. – 1
Alternative I



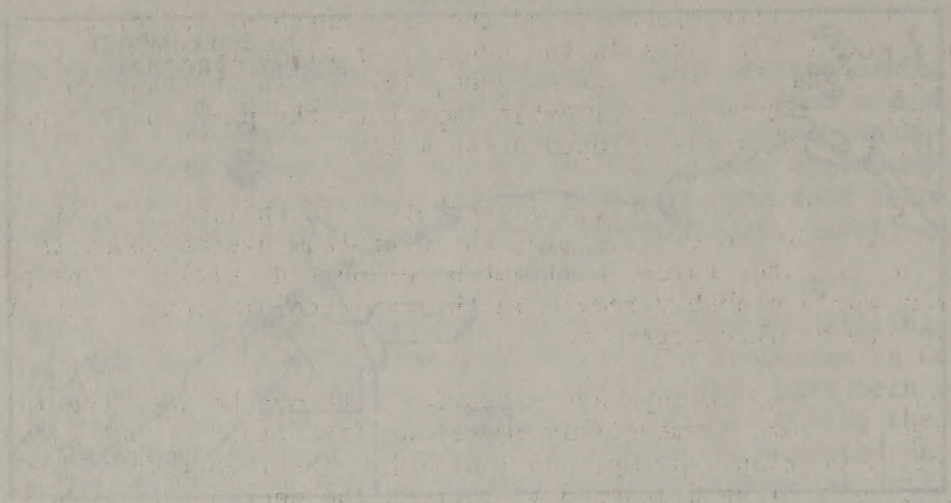
PROPOSED ACTION DAY 30

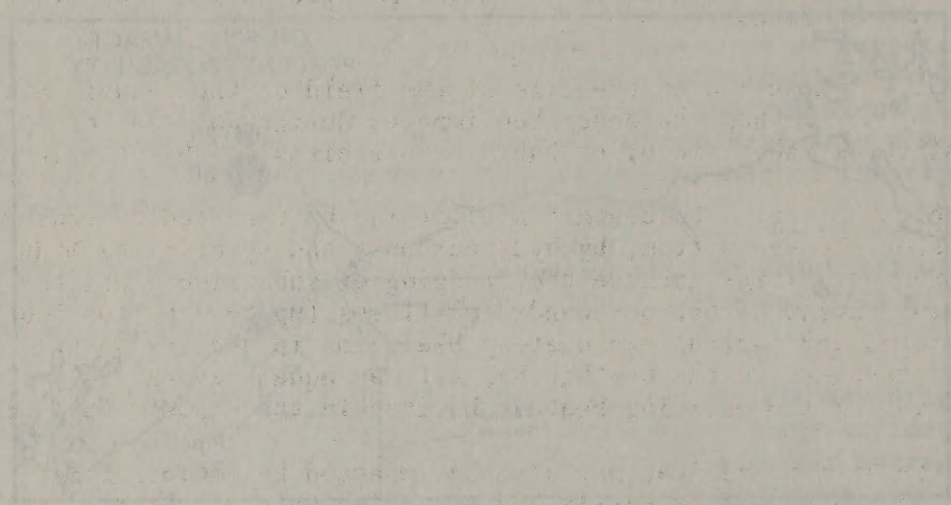


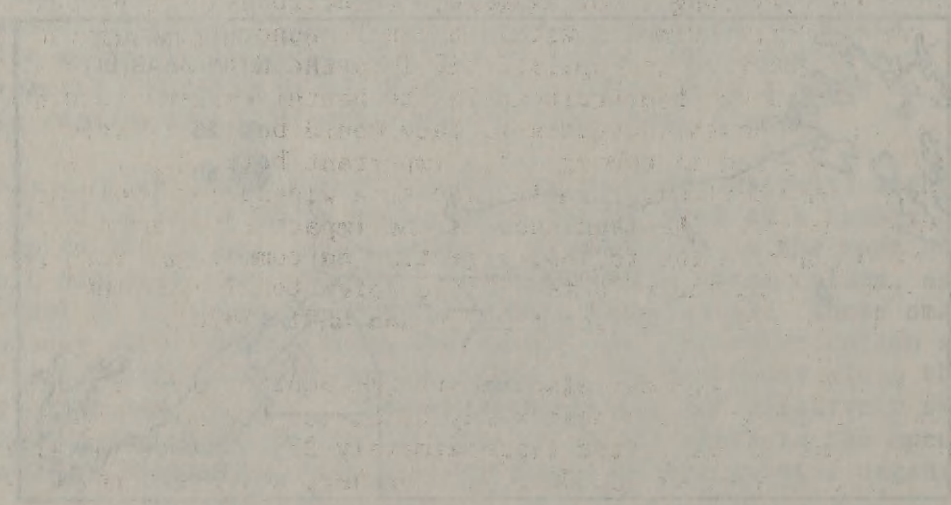
PROPOSED ACTION DAY 10



PROPOSED ACTION DAY 3







After oilspills in other open-water localities, such as the small oilspill in Cook Inlet, the Ekofisk blowout, and the Argo Merchant tanker spill, there were no measurable decreases in the density of planktonic populations (Kinney, et al., 1969; Kuhnhold, 1978; Lannergren, 1978). In the eastern Gulf of Alaska, there should be no noticeable impact on the planktonic organisms as long as an oil slick stays in open ocean water.

If an oil slick or discharge from an onshore oil handling facility enters an estuary with restricted circulation, the petroleum hydrocarbons that become dissolved in the water column will not be dispersed quickly. The petroleum hydrocarbons would probably remain in the water column long enough to affect a majority of the pelagic organisms.

The pelagic organisms in bays and estuaries that may be impacted include the larval stages of some commercially important fish stocks, such as herring, halibut, crab, scallop, shrimp, and flatfish. The magnitude of the impact of these organisms will be discussed further in the section below on the littoral and nearshore habitat.

None of the impacts of hydrocarbons on the pelagic habitat, as discussed above, should be severe.

The cumulative impacts over the life of the field on the pelagic habitat should be no worse than the described impacts during any year of operation, because of the steady rate of exchange of organisms in the pelagic habitat.

Benthic Habitat: The benthic habitat may be impacted by construction activities on the sea bottom, by hydrocarbons, and by drilling muds and cuttings. Construction activities include the dredging of submarine pipelines (about 50 km) and emplacement of bottom-founded platforms (up to 3 bottom-founded production platforms and jack-up exploratory platforms in shallow water). The total area of disturbance to the benthic habitat may equal several km^2. This is a small portion of the existing benthic habitat in the eastern Gulf of Alaska.

Further, the benthic habitat may also be impacted by hydrocarbons. This includes hydrocarbons from spills and formation waters. Generally, the chance is rare that the water soluble hydrocarbons will ever reach the sea bottom and the benthic organisms. However, the longevity of hydrocarbons in the benthic habitat would be very long. For example, hydrocarbons were present for several months in the benthic sediments within a couple hundred km^2 of the Chevron platform that caught fire and spilled oil into the Gulf of Mexico (McAuliffe, et al., 1975). Although hydrocarbons in the benthic sediments might not lead to the death of any benthic organisms, they could be assimilated by detritus feeders and transferred to commercially important bottomfish. Tainting of the flesh of just a few bottomfish could lead to a widespread avoidance of fishery products by consumers. The magnitude of the impact of tainted fish flesh will be discussed further in the following section on commercial fisheries. For further information on the effects of oil, refer to Alaska Dept. of Fish and Game (1978), Wolfe (1977), Malins (1977), and USDI (1976).

Drilling muds and cuttings may also impact the benthic habitat. Organisms in the immediate vicinity of a platform may be buried and smothered by drill cuttings that sink to the bottom (approximately 233 m^3 - 459 m^3 will be released, covering an area of 23,000 m^2). Further, heavy metals in drilling

muds, such as chromium, zinc, cadmium, and lead, have accumulated in the benthic sediments around offshore oil platforms in the Gulf of Mexico (USDI, 1978). The heavy metals accumulated in an area within 1 km^2 of the platforms. However, a biological survey of the benthic fauna and demersal fish around one of the study platforms found no accumulation of heavy metals in animal tissues. The absence of accumulation was perhaps related to the animals' regular seasonal migrations into and out of the study area (University of Texas, 1977). Although the benthic detritus feeders in the eastern Gulf of Alaska may accumulate some heavy metals from drilling muds, the bottomfish are unlikely to accumulate any because the fish perform extensive migrations, similar to the fish in the Gulf of Mexico.

Each well would discharge 700 barrels (11 m^3) of muds. Because of the small area affected by drilling muds, and because of the continual redistribution of the bottomfish, there should be no impacts on the benthic habitat because of the discharge of drilling muds.

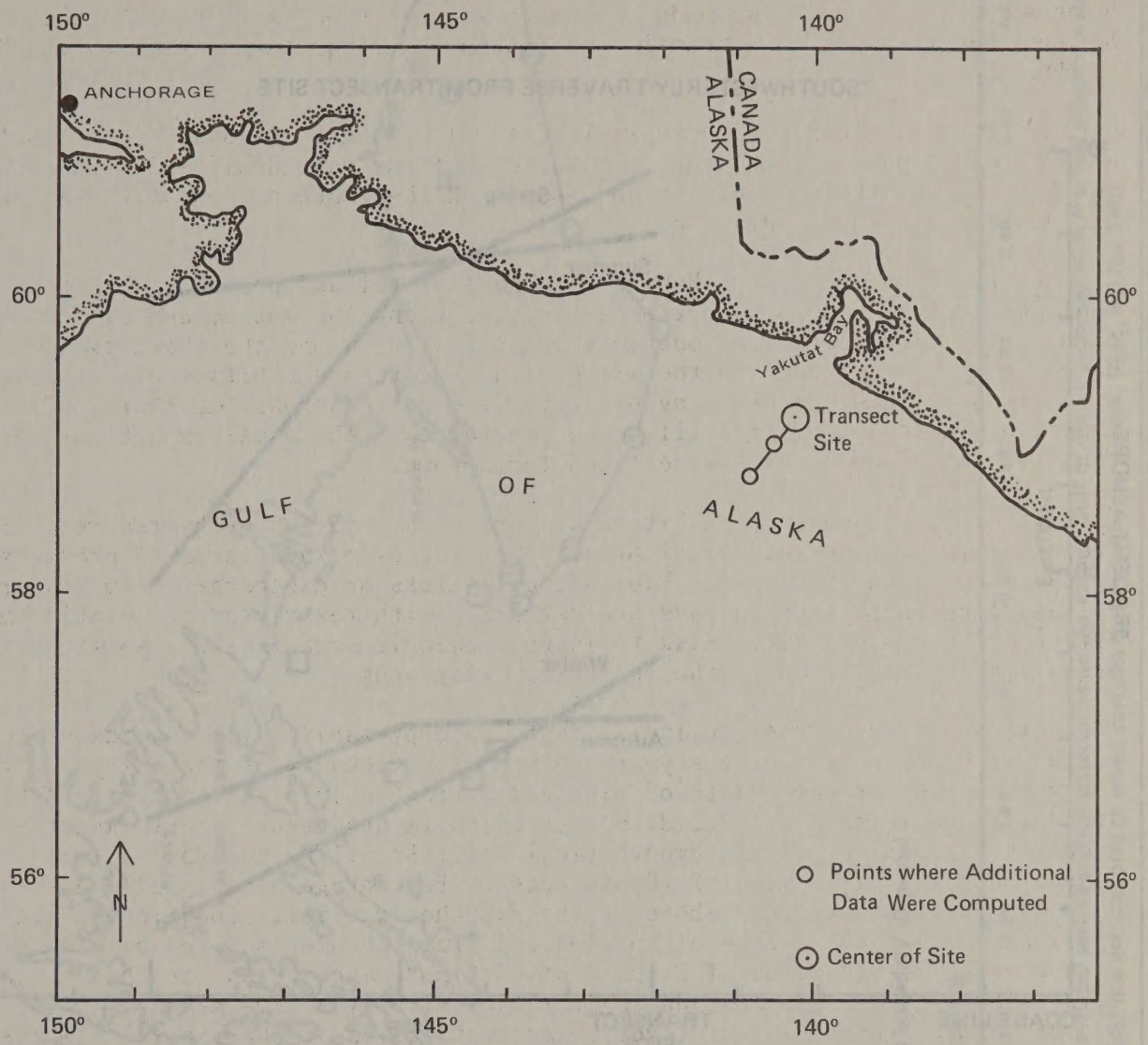
Littoral and Nearshore Habitats: The littoral and nearshore habitats could be impacted by construction activities along the shore, and by hydrocarbons in the water. The construction activities along the shore that may have the greatest impact on the littoral and nearshore habitats are the building of a few docks and the dredging of a pipeline route across the shore. The impact of these activities will be no greater than the usual impact during the construction of docks or sewage lines for a town.

The littoral and nearshore habitats will also be impacted by hydrocarbons in the water in shallow intertidal areas. This problem was discussed previously in the section on the pelagic habitat; oil slicks or discharges from onshore oil handling facilities in bays and estuaries with restricted circulation may affect pelagic organisms. Risk to inshore pelagic organisms and to littoral organisms is quantified in the following paragraphs.

The portion of an offshore oilspill that would probably drift towards shore varies with the season of the year and with the distance of the oilspill from the shore. The probable fate of wind and current-driven surface oil slicks are described in sec. III.A.1.d. on the oilspill trajectory model, and are shown in fig. III.A.2.a.-1 (Hypothetical Spill Locations for the Gulf of Alaska) and fig. III.A.2.a.-2 (Dependence of Percentage of a Spill Impacting Shore on the Distance from Shore of the Hypothetical Spill Locations). The model shows that the chance of spilled oil from the proposed lease area drifting to shore equals a maximum of 31 percent within 3 days and 64 percent within 10 days. The figures show that during the biologically active season (spring and summer) a much larger amount (over 90 percent) of an offshore oilspill would probably reach shore. (This assumes that the oil was spilled within 70 km of the Yakutat shore; most of the proposed lease area is actually within 70 km of the shoreline.) During autumn and winter, a much smaller portion of oil (about 40 percent) would reach shore, probably because of prevailing winds from a different direction and because of turbulent seas that disperse oil.

The length of time that would be required for an offshore oilspill to drift to shore can be determined with fig. III.A.2.a.-3 (Simulated Surface Particle Trajectories in the Eastern Gulf of Alaska Proposed Lease Area and Adjacent Waters). Within 1 week the trajectories traveled an average distance of about 70 km. (For scale, the distance from Yakutat to Kayak Island is about 300

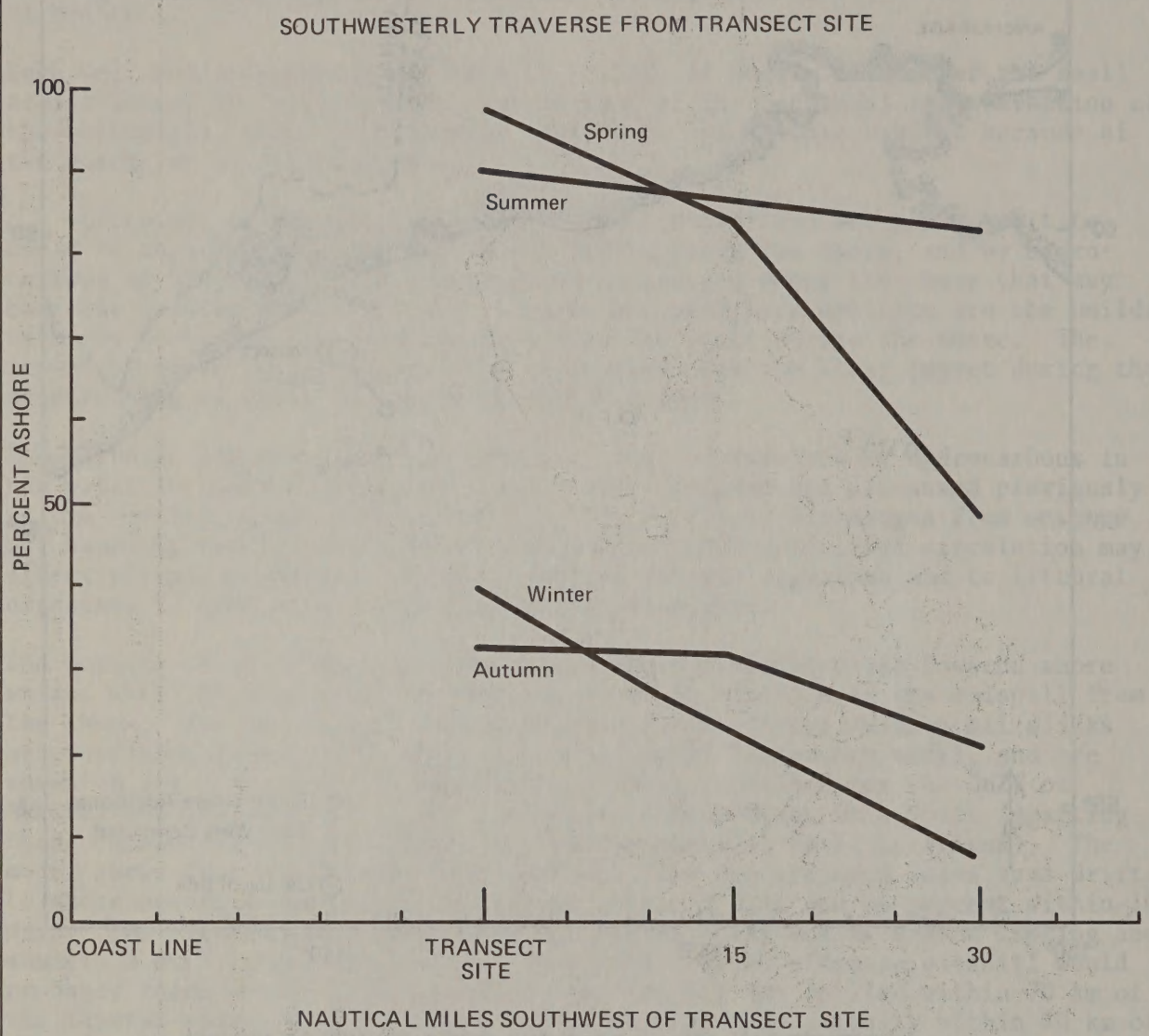
Figure III. A. 2. a. – 1



HYPOTHETICAL SPILL LOCATIONS FOR THE GULF OF ALASKA

Source: Massachusetts Institute of Technology, 1974

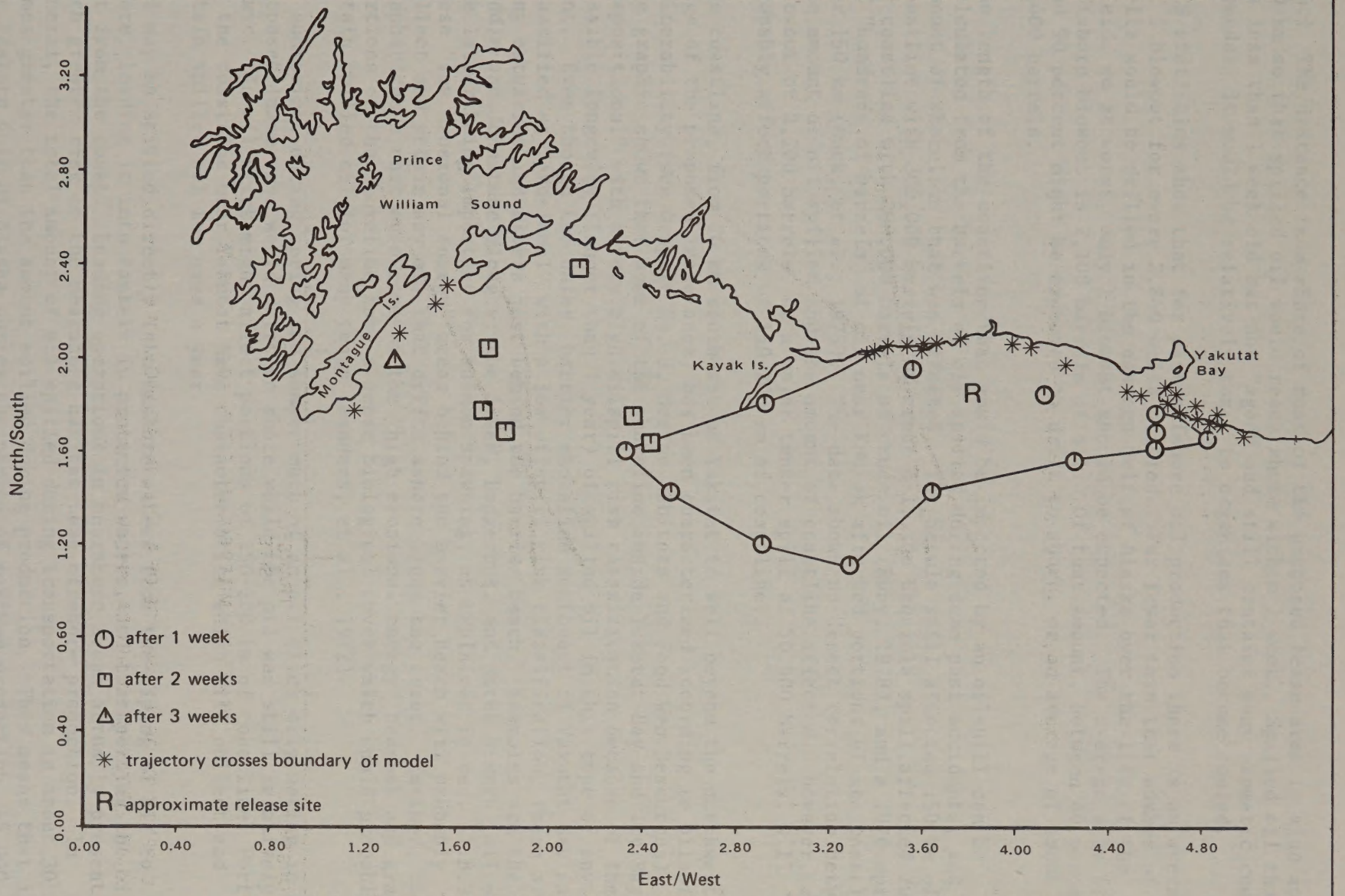
Figure III A. 2. a – 2



DEPENDENCE OF PERCENTAGE OF A SPILL IMPACTING SHORE ON THE DISTANCE FROM SHORE OF THE HYPOTHETICAL SPILL LOCATIONS

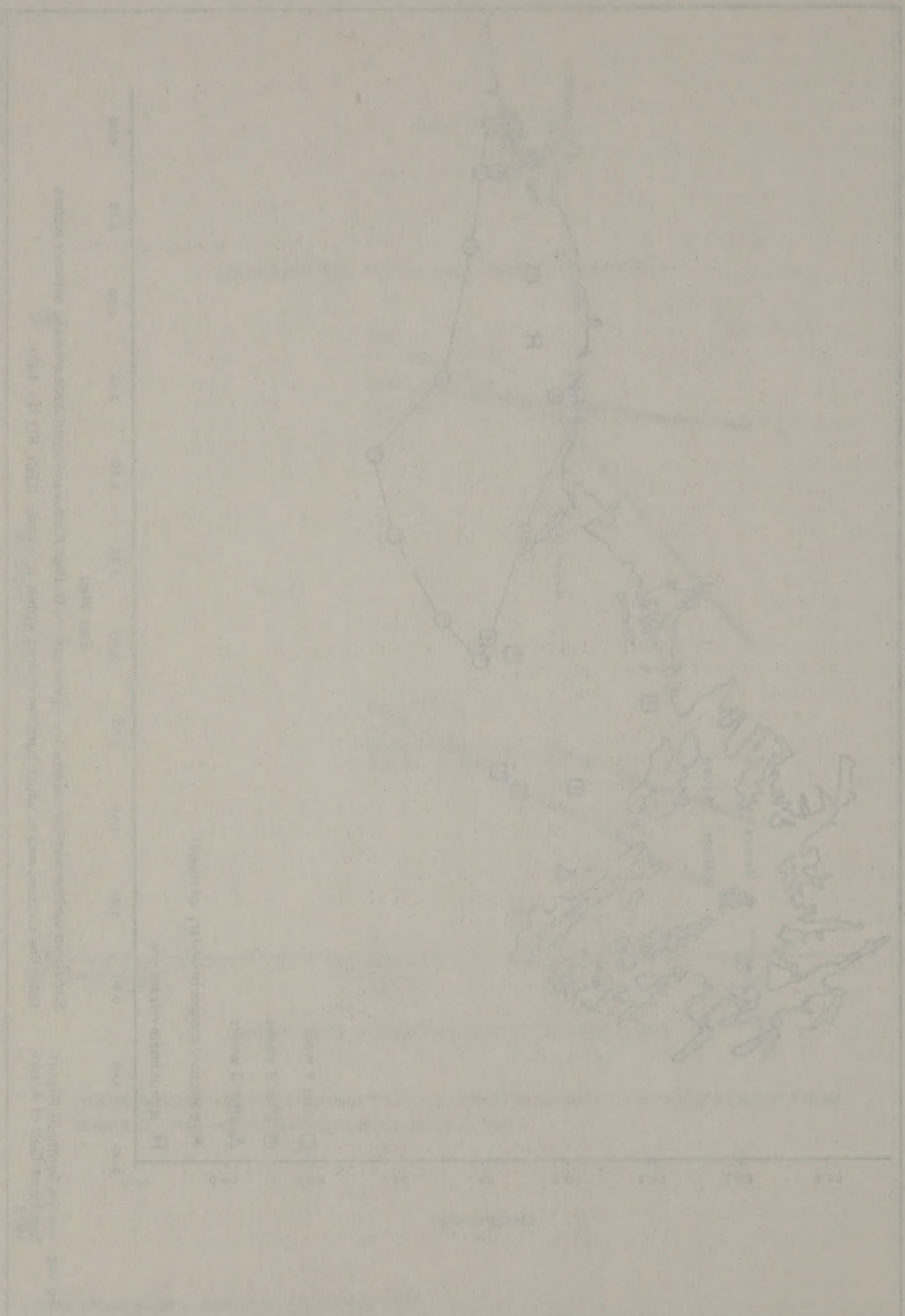
Source: Massachusetts Institute of Technology, 1974

Figure III A. 2. a – 3



Source: Interim Synthesis Report Northeast Gulf of Alaska, 1978

Simulated surface particle trajectories in the eastern Gulf of Alaska proposed lease area and adjacent waters. Solid line encloses area to which particles drifted within one week. (Galt, RU No. 140)



km.) The distance from shore of most of the proposed lease area is also about 70 km so that spilled oil would reach shore within 1 week. Spilled oil that is less than 1 week old has not "aged" and still contains many aromatic compounds. It would be relatively toxic to organisms that become fouled.

OCS statistics show that for past offshore oil production there is an average of 1 blowout for every 2,860 wells drilled. Far fewer than that number of wells would be drilled in the eastern Gulf of Alaska over the life of the field, so at worst, only 1 blowout should be expected. The average size of an offshore blowout is 2,100 barrels of oil. Of that amount, between 40 percent and 90 percent might be expected to drift to shore, or an average of about 1,400 barrels.

The length of the coastline that would be impacted by an oilspill can be calculated from the barrels of oil spilled during some past accidents, and the amount of shoreline that was affected. The Metula spill affected 150 km of coastline with 300,000 barrels of crude oil; the Urquiola spill affected 20 km of coastline with 200,000 barrels of crude oil (Ruby, 1978); and a 1970 spill of "hundreds of barrels" of oil near Kodiak affected portions of its coastline for 150 km (Buck, et al., 1975). The data shows no direct correlation between the amount of oil spilled and the amount of coastline affected. However, a blowout of 2,100 barrels, or a major tanker spill of 50,000 barrels, will probably affect portions of 150-200 km of coastline.

The coastline, from 70 km southeast of Yakutat to well beyond the northwest edge of the proposed lease area, has been characterized according to oilspill vulnerability (see Graphic No. 3, Marine Habitats and Food Web Resources). The graphic shows that some of the shoreline inside Yakutat Bay and Icy Bay is "depositional" with a very high oilspill risk classification because of the possible longevity (longer than 1 year) of spilled oil in this type of environment. Even though the outer, barrier shoreline southeast of Yakutat Bay is classified as "erosional" with a low oilspill risk classification, there are many estuaries and rivers just behind the barrier beach. Examples are the Middle and Johnstone Sloughs; the Alsek, Dangerous, and Situk Rivers (all of the latter being important for salmon spawning, as explained in sec. II.B.2.). These "low erosional energy" areas behind the barrier beach will probably collect and retain any oil that drifts ashore along the coast. Further, the graphic shows that even some of the "high erosional energy" bedrock and gravel portions of the shoreline have a dense biological cover which would probably retain spilled oil for many years (Sanders, et al., 1972).

To summarize, during spring and summer much of an oil slick originating in the proposed lease area would drift to shore while the oil was still relatively toxic. An oil slick might affect portions of 150-200 km of coastline. Portions of the coastline near Yakutat have characteristics which will collect and retain spilled oil for over a year.

Oil may be spilled directly into inshore waters from the piping of oil to shore, loading it into tankers in protected waters, and transporting the oil out from the coast. Loading operations in nearshore areas actually present a much greater risk to the nearshore habitat than offshore production. In general, the total amount of oil spilled during transportation is about 30 times greater than the amount spilled during production. This means that in the eastern Gulf of Alaska during the period of maximum production, 45,000

barrels/year might be spilled as a result of all phases of oil transportation. In the Port of Valdez, much more oil than the total estimated oil resources in the proposed lease area has already been loaded into tankers with no serious spills to date. However, it is perhaps reasonable to assume that sometime during the life of the field there might be a large oilspill in a bay or estuary, and that residues of it would also persist in the environment for a year or longer.

The affect of oil on both attached and pelagic littoral organisms has been studied along many coasts. Littoral plants, which were killed by oilspills in Massachusetts and Texas, had not recovered after 3 years (Hampson and Maul, 1977; Holt, et al., 1978). The Massachusetts spill also caused almost a total kill of small infauna organisms (Sanders, et al., 1972). Larger organisms in the littoral zone such as mussels and clams may be killed, as they were after the Amoco Cadiz oilspill; these organisms also accumulate, or become tainted by low-level concentrations of hydrocarbons (Scarrett and Zitho, 1972; Milan and Whelan, 1978). Inshore concentration of the juvenile stages of commercially important bottomfish, such as halibut, flounder, crab, and scallops, may develop abnormally (Kuhnhold, et al., 1978). Juvenile stages of crabs, shrimp, and salmon, which concentrate in nearshore waters, were killed within 4 days by dilute concentrations of Cook Inlet and Prudhoe Bay crude (Karinen and Rice, 1974; Rice, et al., 1975; Brodersen, et al., 1977). Perhaps most importantly, very low sublethal concentrations of oil stress organisms in the nearshore habitat, like pink and chinook salmon. The stress is shown by increased respiration rates and by behavioral avoidance (Brockson and Bailey, 1973; Thomas and Rice, 1975; Rice, et al., 1976). The additional stress due to oil means that these organisms might have a difficult time adapting to other, normal environmental stresses, such as saltwater/freshwater changes during migrations. All of these results indicate that oil in nearshore waters would cause commercially important organisms to avoid the nearshore areas in which they are harvested and congregate for spawning runs, would directly kill commercially important organisms, or would indirectly affect them by killing the food web resources on which the commercially important organisms depend. The exact magnitude of this impact is assessed in the following section (Impacts on Fish Resources) and sec. III.A.2.b., Impacts on the Local Economy of Yakutat.

In summary, the impacts on the littoral and nearshore habitat during the life of the field are likely to be that an oil slick would drift to shore or would occur in the nearshore area. The spill would probably affect portions of 150 km of coastline near Yakutat. Portions of the coastline would retain oil for a year or longer. It would directly kill or indirectly affect (through insufficient food web resources) commercially important organisms such as salmon fry. The magnitude of the impact on these commercially important species is described in the following section (Impacts on Fish Resources) and sec. III.A.2.b., Impacts on the Local Economy of Yakutat.

Conclusions: Of all the cumulative impacts on the marine habitats (pelagic, benthic, nearshore and littoral), only 2 impacts are relatively large-scale or long-term. One impact is that the pelagic organisms in nearshore waters would probably be affected for a year or longer by an oilspill sometime during the life of the project. The second major impact is that the flesh of commercially important benthic (bottom) fish and shellfish may be tainted by spilled hydrocarbons. While the latter may not involve many animals, it could lead to a large-scale consumer avoidance of fishery products. The magnitude of both

of these impacts are discussed further in the following section (Impacts on Fish Resources) and sec. III.A.2.b., Impacts on the Local Economy of Yakutat.

In conclusion, none of the impacts of hydrocarbons on the pelagic habitat should be severe.

Cumulative Effects: The cumulative impacts over the life of the field on the pelagic habitat should be no worse than the described impacts during any year of operation, because of the steady rate of exchange of organisms in the pelagic habitat.

The cumulative oilspill effects from sale 39, which has become a nonproducing lease area, and thus has no probability of oil spillage, on the marine habitats of the proposed sale 55 area are none.

Other OCS areas such as lower Cook Inlet and the Kodiak shelf area are over 500 miles away and extremely far downstream in terms of the circulation of the Gulf of Alaska. Because of their great distance away and physical separation in terms of a potential oilspill reaching marine habitats in the proposed lease area, these other potential OCS areas of activity are not likely to have any cumulative effects on the marine habitat in the proposed sale 55 area.

In general, the marine benthos on the continental slope and abyssal plain of the Gulf of Alaska and north Pacific Ocean are too deep to be affected by surface related activities including a potential spill.

Tanker traffic from the TAPS terminal at Valdez, Alaska sails southward and westward of the proposed lease area. There are no charted shoals or islands to the west of the proposed lease area upon which such tanker traffic could conceivably run aground. Ship collisions on the high seas are however, an ever present possibility although not a likely one.

The cumulative impacts from other OCS sales, increased tanker traffic, timber activities, and d-2 legislation should not significantly affect the offshore benthic organisms.

Unavoidable Adverse Effects: No serious adverse impacts are anticipated on the various habitats.

Impacts on Fish Resources: Table III.A.2.a.-1 gives a summary of fin and shellfish species, habitat, season of occurrence, and the potential interaction of oil with these items. For more detailed information regarding these interactions, refer to ADF&G (1978), Wolfe (1977), Malins (1977), and USDI (1976).

Herring, halibut, Dolly Varden char, steelhead trout, and other pelagic (free swimming) and demersal (bottom dwelling) finfish species are found throughout the Yakutat area. These finfish may be divided into groups for describing impacts. These groups are: 1) fish with free floating planktonic eggs; 2) fish with adhesive eggs; and 3) fish which bear their young alive.

Pacific halibut and other flatfish are all ocean bottom dwellers that have free floating eggs and larvae. At spawning time, the fish form dense schools and both sexes release their sex products into the water where fertilization

takes place. After fertilization, the eggs become positively buoyant and generally float at or near the surface. After the eggs hatch, the larval fish remain in the surface waters until metamorphosis when the young fish return to the ocean bottom where they feed and grow to maturity. It is during this free floating period that these types of fish are most vulnerable to pollution events on and in the water. The eggs drift to the west of the proposed lease area and settle out near Kodiak.

In the Yakutat area, halibut spawn between November and January at depths between 260-400 m. The majority of the commercial catch is in nearshore waters between 60-140 m during May through August.

No definitive studies have been conducted on the effects of Alaskan oil on the eggs or larvae of these species. However, several past studies on similar species (James, 1926; Kuhnhold, 1970; Wilson, 1970) have indicated adverse results. The egg and larval forms, while in the surface waters, are the most susceptible life stages. It would, therefore, be reasonable to assume that, should a chronic or massive spill occur during these critical life stages, the population of eggs and/or larvae would be reduced. There is presently no way to quantify the extent of such an impact.

Groundfish species such as pollock, Pacific cod, black cod, Pacific Ocean perch, and flatfish are all demersal forms living in deep water. The eggs and/or larval stages of these fish are free floating and are vulnerable to oil contamination for a period after the adults spawn. Should the juvenile portion of the population be killed by a massive event, the entire population would be affected. The biological impact relates to the severity of any oil pollution event and depends upon a multitude of factors which cannot be quantified.

Herring and sculpins are included in this category. In the Yakutat area, herring move inshore to spawn generally from May through mid-June; however, the peak of spawning varies greatly from year to year. Herring generally spawn on or near living plants such as eelgrass, kelp or other algae, and rocky substrates.

Hatching time varies with temperature, but averages 15 days from spawning to hatching. The larvae are very delicate and subject to environmental influences (Smith, 1976). Young herring collect in small schools and gradually move seaward toward the mouths of bays or inlets where they grow rapidly and consolidate into large schools. These schools move into deep water by late fall. It is possible but not known whether these fish move into the tracts for sale in this proposal. While offshore they spend much of their time at or near the the water surface.

The presence of a pollutant on the water and the beach could select against the highest quality eggs, and would increase mortality of all eggs. A massive spill or chronic pollution during the 3- to 4-week reproductive period could have a significant impact on adult, egg, and larval mortality. Natural pre-hatching mortality varies from about 60-90 percent, and larval mortality is thought to be as much as 99 percent (Smith, 1976). Any additional stress on this life stage could adversely affect whole year classes.

According to the oilspill trajectory model, there is an overall 20 percent chance of a spill from any source impacting herring spawning and rearing areas

Table III.A.2.a.-1 (1)
Fish Species, Habitat Use, and Potential Oil Interactions

Species of Biota Group	Principal Habitat	Areas of Peak Occurrence	Season of Peak Occurrence	Area Use by Biotic Group	Potential Oil Biota Interaction
ADULTS					
Sockeye	Congregate in Estuaries	Nearshore; Anadromous Streams with Lakes; Situk, Alsek, East-Dohn Rivers	Mid May-Early September	Spawning migration	Behavioral; Block access to spawning streams
Pink	Congregate in Estuaries	Nearshore; Anadromous Streams; Intertidal; Yakutat Bay; Humpy Creek	Late June-Early September odd years	Spawning; spawning migration	Behavioral; Block access to spawning areas; Toxic to spawn
Chum	Congregate in Estuaries	Nearshore; Anadromous Streams; Intertidal; Alsek River	Early June-Late September	Spawning; spawning migration	Behavioral; Block access to spawning areas; Toxic to spawn
Coho	Congregate in Estuaries	Nearshore; Anadromous Streams; Situk, Alsek, East-Dohn Rivers	Late June-Late September	Spawning migration	Behavioral; Block access to spawning areas
	Pelagic, Surface	Throughout the Gulf of Alaska	Winter, Spring	Feeding	Deplete food source; Behavioral; Ingestion
Chinook	Congregate in Estuaries	Nearshore; Anadromous Streams; Alsek River	Mid May-Late August	Spawning migration	Behavioral; Block access to spawning streams
	Pelagic	Surface; Yakutat Bay	Winter, Spring	Feeding	Deplete food source; Behavioral; Ingestion
Steelhead	Congregate in Estuaries	Nearshore; Anadromous Streams; Yakutat Region	Spring and Fall	Spawning migration	Behavioral; Block access to spawning stream
	Estuaries	Nearshore	Fall and Early Winter	Feeding; overwintering	Additional stress on spent spawners; Ingestion

continued

Table III.A.2.a.-1 (2)
Fish Species, Habitat Use, and Potential Oil Interactions

Species of Biota Group	Principal Habitat	Areas of Peak Occurrence	Season of Peak Occurrence	Area Use by Biotic Group	Potential Oil Biota Interaction
Dolly Varden	Congregate in Estuaries	Nearshore; All Anadromous Streams	Late June-October and Early Winter	Spawning migration	Behavioral; Block access to spawning streams
JUVENILES					
Sockeye	Enter Estuary	Nearshore; Surface; Lagoon areas behind spits	Early June-Early July	Smolting; Feeding	Toxicity; Reduced food supply; Behavioral; Ingestion
	Seaward Migration	North and west along the Continental Shelf; Surface	Early August-Early Fall	Outmigration; Feeding	Toxicity, Behavioral; Ingestion
Pink	Enter Estuary	Nearshore; Surface; Yakutat Bay	Early June-Mid July	Smolting; Feeding	Toxicity, Reduced Food supply; Behavioral; Ingestion
	Seaward Migration	North and west along the Continental Shelf; Surface	Early August-Late September	Outmigration; Feeding	Toxicity; Behavioral; Ingestion
Chum	Enter Estuary	Nearshore; Surface; Alsek River Estuary	Early June-Mid July	Smolting; Feeding	Toxicity; Reduced Food supply; Behavioral; Ingestion
	Seaward Migration	North and west along the Continental Shelf; Surface	Mid August-Late Fall	Outmigration; Feeding	Toxicity; Behavioral; Ingestion
Coho	Enter Estuary	Nearshore; Surface; Lagoons behind river mouth spits	Early June-Early August	Smolting; Feeding	Reduced food supply; Behavioral; Ingestion
	Seaward Migration	North and west along the Continental Shelf; Surface	Late Summer-Early Winter	Outmigration; Feeding	Behavioral; Ingestion

continued

Table III.A.2.a.-1
Fish Species, Habitat Use, and Potential Oil Interactions

Species of Biota Group	Principal Habitat	Areas of Peak Occurrence	Season of Peak Occurrence	Area Use by Biotic Group	Potential Oil Biota Interaction
Chinook	Enter Estuary	Nearshore; Surface; Alsek River estuary	Early June-Early August	Smolting; Feeding	Reduced food supply; Behavioral; Ingestion
	Seaward Migration	North and west along the Continental Shelf; Surface	Late Summer-Early Winter	Outmigration; Feeding	Behavioral; Ingestion
Steelhead	Enter Estuary	Nearshore; Surface	Early June-Mid July	Smolting; Feeding	Reduced food supply; Behavioral; Ingestion
	Seaward Migration	North and west along the Continental Shelf; Surface	Unknown	Outmigration; Feeding	Behavioral; Ingestion
Dolly Varden	Enter Estuary	Nearshore; Surface	Early April-Late June; September-October	Smolting; Seeking overwintering streams; Feeding	Toxicity, Reduced food supply; Behavioral; Block access to overwintering streams; Ingestion
EGGS AND HATCHING					
Pink	Intertidal	Yakutat Bay	July-May	Incubation; Hatching; Emergence	Smothering;Toxicity
Chum	Intertidal	Alsek River	July-May	Incubation; Hatching; Emergence	Smothering; Toxicity
ADULTS					
Herring	Rocky Beach	Intertidal; Shallow Subtidal Yakutat Bay	Mid May-Mid June	Spawning	Intertidal spawning; Toxic to spawn

continued

Table III.A.2.a.-1
Fish Species, Habitat Use, and Potential Oil Interactions

Species of Biota Group	Principal Habitat	Areas of Peak Occurrence	Season of Peak Occurrence	Area Use by Biotic Group	Potential Oil Biota Interaction
	Benthic Overwintering	Near Bottom; approx. 50 fathoms	Late Fall through Winter	Overwintering; No feeding	Behavioral
EGGS AND LARVAE					
Herring	Rocky Beach	Nursery Intertidal; Shallow Subtidal; Yakutat Bay	May-June	Incubation; Hatching	Toxicity; Smothering; Reduced hatch
	Nearshore	Nursery Intertidal; Shallow Subtidal; Yakutat Bay	May-Late Fall	Feeding	Reduced food supply; Toxicity, Ingestion
JUVENILES					
Herring	Nearshore	Surface; Yakutat Bay	Fall, Winter, Spring Summer	Feeding	Reduced food supply; Behavior; Toxicity Ingestion
EGGS THROUGH LARVAE					
Sablefish	Pelagic	Surface of the Gulf of Alaska	Early Spring-Late May	Incubation; Hatching; Feeding	Toxicity; Reduced food supply; Ingestion
EGGS					
Pacific Sandfish	Dermersal	Sandy Bottom: Subtidal; Nearshore	Winter	Spawning: Incubation	Toxicity; Smothering spawn; Behavioral
JUVENILE					
Pacific Sandfish	Demersal	Sandy Bottom; Subtidal; Nearshore	Winter-Spring	Feeding	Toxicity; Behavioral; Reduced food supply; Ingestion

continued

Table III.A.2.a.-1
Fish Species, Habitat Use, and Potential Oil Interactions

Species of Biota Group	Principal Habitat	Areas of Peak Occurrence	Season of Peak Occurrence	Area Use by Biotic Group	Potential Oil Biota Interaction
Jack Mackerel	Pelagic	Near Surface; Locates near 11°C Isotherm	Late Summer	Feeding	Ingestion
Chub Mackerel	Pelagic	Near Surface; Coastal areas	Occasional	Feeding	Ingestion
Atka Mackerel	Demersal	10-20 m depths nearshore; Rocky swift current areas	Summer	Spawning	Toxicity; smothering spawn
ADULTS					
Lingcod	Demersal	Rocky; Shallow Subtidal; Intertidal	December-March	Spawning	Toxic to spawn; Inhibit spawning
EGGS					
Lingcod	Demersal	Rocky; Shallow Subtidal	December-March	Incubation; Hatching	Behavior of male; Smothering; Toxicity
LARVAE					
Lingcod	Demersal	Rocky, Shallow Subtidal; Intertidal	January-Late June	Feeding	Toxicity; Reduced food supply; Ingestion
Pacific Ocean Perch	Demersal	Shelf break and slope; Yakutat Canyon	Year-round	Spawning; Maturation; Feeding	Possible ingestion
Other rockfish	Demersal	Shelf break and slope; Yakutat Canyon	Year-round	Spawning; Maturation; Feeding	Possible ingestion

Table III.A.2.a.-1
Fish Species, Habitat Use, and Potential Oil Interactions

Species of Biota Group	Principal Habitat	Areas of Peak Occurrence	Season of Peak Occurrence	Area Use by Biotic Group	Potential Oil Biota Interaction
ADULTS English Sole	Demersal	Nearshore	Winter	Spawning	Toxic to spawn; Behavioral
EGGS AND LARVAE English Sole	Pelagic	Surface; Nearshore	Winter; Spring	Incubation; Feeding	Toxicity; Reduced food supply; Ingestion
ADULTS Petrale Sole	Demersal	Move on to Continental Shelf	Spring, Summer	Feeding	Ingestion
ADULTS Dover Sole	Demersal	Move on to Continental Shelf after spawning	Spring, Summer	Feeding	Ingestion
ADULTS Starry Flounder	Demersal	Nearshore; Yakutat	Winter	Spawning	Toxic to spawn
EGGS AND LARVAE Starry Flounder	Pelagic	Near surface; Yakutat	Winter, Spring	Incubation; Feeding	Toxicity; reduce food supply; Ingestion
ADULTS Pacific Halibut	Demersal	Near bottom; Near 200 m isobath; West side of Yakutat Canyon	Winter	Spawning	Toxic to spawn; Behavioral

continued

Table III.A.2.a.-1
Fish Species, Habitat Use, and Potential Oil Interactions

Species of Biota Group	Principal Habitat	Areas of Peak Occurrence	Season of Peak Occurrence	Area Use by Biotic Group	Potential Oil Biota Interaction
ADULTS					
Capelin	Pelagic	Nearshore; Near Surface; Sandy beaches	Late Spring-Early Summer	Spawning	Toxicity; Toxic to spawn; Behavioral
ADULTS					
King Crab	Deep water; Come into shallow water to spawn	Yakutat Bay	June-August	Feeding; Spawning	Low probability because of water depth
JUVENILES					
King Crab	Shallow water to 100 m	Yakutat Bay	Year round	Feeding; Rearing	High potential for adverse effects
LARVAE					
King Crab	Semi-pelagic to benthic in shallow water	Yakutat Bay	Semi-pelagic March-July	Feeding; Rearing	Toxicity to larvae high
ADULTS					
Tanner Crab	Deep water 50 m when spawning	Cape Suckling to Pt. Manby	January-May in shallow water	Feeding; Spawning	Low probability because of water depth
LARVAE					
Tanner Crab	Semi-pelagic to benthic in shallow water	Cape Suckling to Pt. Manby	Semi-pelagic January-July	Feeding; Rearing	Toxicity to larvae high
ADULTS					
Dungeness Crab	Deep water; in winter;	Cape Suckling to Cape Fairweather	Spawn October-December	Feeding; Spawning	Medium probability summer; Low in

continued

Table III.A.2.a.-1
Fish Species, Habitat Use, and Potential Oil Interactions

Species of Biota Group	Principal Habitat	Areas of Peak Occurrence	Season of Peak Occurrence	Area Use by Biotic Group	Potential Oil Biota Interaction
	To tideline during spawning				winter
LARVAE					
Dungeness Crab	Semi-pelagic to benthic in shallow water	Cape Suckling to Cape Fairweather	Semi-pelagic June-December	Feeding; Rearing	Toxicity to larvae high
ADULTS					
Shrimp	Deep water (days) To surface (nights) Spawn in bays and around islands	Cape Suckling to Sitkagi Bluffs and Yakutat Bay	Year round spawn; Spawn August-September	Feeding; Spawning	Can effect eggs (carried on females) and food
LARVAE					
Shrimp	Semi-pelagic benthic in shallow water	Cape Suckling to Sitkagi Bluffs and Yakutat Bay	February-July	Feeding; Rearing	Toxicity to larvae high
ADULTS					
Scallop	60-180 meter depths; Benthic	Bering Glacier to Cape Fairweather	Year-round	Feeding; Spawning	Low probability because of depth
LARVAE					
Scallop	Plankton near surface	Bering Glacier to Cape Fairweather	June-July	Feeding; Rearing	Toxicity to larvae high

Source: U.S. Dept. of Commerce, 1978; State of Alaska (ADF&G, 1978).

during the period of April to October. It is also estimated that 1 large spill will happen during the life of the project. It is possible that an entire year class of herring could be eliminated by a pollutant event resulting from this proposal. The odds of this happening are extremely low. However, there will probably be some reduction in herring population for 1 year classes. What this means is that a reduction of total harvestable populations is unquantifiable.

The analysis of effects on other species of fish mentioned in this section would indicate an even smaller impact than on herring. The open ocean habitat reduces severity of pollutant events on a population. The effect is unquantifiable.

Conclusions: There is a possibility that groundfish, halibut, and herring populations may be reduced by some unquantifiable amount during the life of this proposal. Adverse events would probably only occur in 1 year during the project, and should they occur when the larvae of these species are not present (about 6 months of the year), little or no effects would be attributable to oil and/or gas production. Should the larvae be present during the events, only those that actually come in contact with an oil slick or the water soluble fractions of oil around or below the slick would be adversely affected.

Cumulative Effects: Adverse effects from oil and gas activities which include the present tankering of oil from Valdez and Cook Inlet/Kodiak, the probable tankering of refined product from Valdez, and the less probable production and shipment of oil and/or gas from the sale 39 area to the west of Yakutat could affect these species populations over time should these activities put oil into the water. Impacts would be similar to those mentioned above and similarly unquantifiable. Only if a cumulative spill would occur during the maximum time of larvae populations and sensitivities could a population reduction effect be attributed to these cumulative development activities. This chance is extremely remote. Of the items mentioned, the tankering of crude oil and refined product from Valdez south, offshore of the proposed sale area, are the most likely to contribute to cumulative effects.

Unavoidable Adverse Effects: There would probably be some unavoidable fish population reductions on a short-term localized basis. Chronic pollution and/or habitat alteration could affect populations, but only for the life of the project and the recovery period afterwards.

* Impacts on Commercial Fishing:

Salmon Species: Because of their dependence on inshore areas for migration routes, spawning, larval survival, and juvenile feeding, salmon may be the most vulnerable commercial species in the area to be affected by this proposal.

Salmon fry, especially pinks, remain in estuarine areas near Yakutat for several months, so would be especially vulnerable to oilspills. The reduction or loss of a year class along part of the coast would be especially serious if it affected the pink salmon for which there are naturally alternating strong and weak year classes (due to poor littoral food supply, abundance of predators, or some other natural biophysical factor).

* Issue of Significant Concern

Even low, sublethal concentrations of oil stress pink and chinook salmon, as shown by increased respiration rates and by behavioral avoidance (Brockson and Bailey, 1978; Thomas and Rice, 1975; Rice, et al., 1976). This effect is probably true in the other untested species of salmon. This means that salmon may avoid inshore waters which are contaminated with oil. The inshore areas are also the locations in which salmon are commercially harvested in gill nets, as described in the section on commercial fisheries.

A pollutant event caused by this proposal may adversely affect a year class of fry as well as a year class of adults.

The salmon population reduction due to an oilspill impacting the littoral zone can perhaps be approximated by the natural difference in the size of the strong and the weak year classes of pink salmon fry returning to the coast near Yakutat. During the last 12 years, the commercial catches on the weak, even-numbered years have averaged one-seventh the poundage of the catches on the strong, odd-numbered year classes. This natural difference between good and bad year classes of pink salmon implies that the catch of salmon along the Yakutat coast might be reduced to one-seventh of that caught in 1978 as the result of an oilspill.

As discussed in the section on Marine Habitats and Food Web Resources, a spill of 1,500 barrels could affect portions of 150-200 km of coastline. This is equal to the entire range of coastline where salmon spawn around Yakutat, so it is possible to affect all of the salmon caught near Yakutat. It was also shown that oil could drift to shore while still relatively toxic, and that it could persist in the inshore littoral habitat for at least a year. This also means that an oilspill could affect all of the species of salmon that spawn along the Yakutat coastline at different times of the spring and summer. Further, the discussion showed that 85-100 percent of an offshore oilspill would drift to shore during the spring and summer; during the rest of the year the portion was lower (40 percent). Averaged over the whole year, 60-70 percent of an offshore oil slick might drift to shore.

OCS statistics for offshore oil production show that there is an average of 1 major blowout for every 2,860 wells drilled. In the proposed lease area, the most likely scenario is that only 1/400th of that number of wells would be drilled during the life of the field. It means that, over the life of the field, there is only a 1-in-400 chance that there will be a blowout. If 60-70 percent of a major blowout (average size 2,100 barrels) drifts to shore, it could result in a poor spawning year for all of the salmon near Yakutat. The result of a hypothetical poor spawning year could be 100,000 to 200,000 fish loss. There is, however, only a 1-in-400 chance of that occurring.

Crab Species: The 2 major species of crab (tanner and dungeness) have similar life histories in that the adults spend the winter months in deep (150-450 m) oceanic waters, and migrate to shallow (6-20 m) water in the spring or early summer. The eggs, which have been carried by the female for about a year from the previous year's spawning activities hatch and the young spend from 1-4 months (March-June) as free swimming planktonic larvae. After the larval stage, the juveniles assume the adult form, settle to the bottom and spend from 1-5 years in shallow bays and estuarine areas before joining the adults on their migrations.

The larval forms are more susceptible to floating oil; the juveniles are somewhat susceptible to both floating and sinking oil. The adults would be affected by the oil which sinks to the bottom. All age groups would be affected by the reduction of food species. In the event of a large oilspill, the young could be killed and thus reduce the potential adult population. If this oil settles to the bottom, the adults may also be killed, further reducing the population. Population reductions would affect the fishery. Crabs could be flavor tainted by contact with oil and other pollutants thus reducing their value.

Exposure to chronic pollution associated with oil development and production could affect the larval and juvenile life stages of crab and other shellfish species. Dungeness crab juveniles and adults spend lengthy periods in shallow water; tanner crab spend some time in shallow water. Effects of chronic exposure are as yet unknown, but could range from impairment of development through direction reaction on the animal or because food species are killed, to "ecological death" caused by direct interference with development from the exposure.

Studies by Rice, et al (1976) tested Cook Inlet and other oils against a number of oceanic organisms, including larval snow and dungeness crab. Larval forms of snow and dungeness crab in these studies exhibited relatively high (10.8 and 7.1 ppm of oil respectively) resistance to Cook Inlet oil. The amount of oil it takes to induce moribundity in larvae was approximately 2 ppm for both species. Larvae can exist in the moribund stage several days before dying. Larvae do not recover from this stage.

One of the conclusions of the study was that of the forms studied, larvae were the most vulnerable to oil of the life stages tested in this program. They were quantitatively more sensitive to oil toxicity, especially during molting. Crustacean larvae may be particularly susceptible to oil toxicity compared to adults because of the frequency of molting.

Studies have shown that in the larval stage these species are very vulnerable to adverse effects caused by the water soluble fraction of oil. According to the oil spill trajectory analysis, there is a 10-42 percent chance of an offshore spill reaching larval/juvenile crab habitat in 3 days and 8-51 percent chance of a pollutant event coming into contact with these areas in 10 days. Because the water soluble fraction of petroleum products are quite voluble, they dissipate into the air over a relatively short period, depending on sea state, temperature, and type of product. The younger the product when it contacts an organism, usually the more damage can be done to the population.

If we assume that crab larvae are all along the Yakutat coast for 90 days during the period April 15 to July 15, and are being moved by the prevailing current westward, and assume that a major spill will cover half the coast area for a 30-day period which would kill all the crab larvae it comes in contact with, the outcome could be reduction of a year class by one-fourth to one-third of its size. What this would ultimately mean in reduction of adult population is unknown.

Individual organisms subjected to sublethal exposures may undergo "ecological death" if they are incapable of adjusting to natural stresses in their environments because of this exposure. For example, postmolt snow crab during bio-

assay testing lost as many as seven legs, including both chelae, during short exposures to crude oil (Karinen and Rice, 1974). Even though the crabs lived through the exposure, they would not have survived in the natural environment.

Chronic exposure may adversely affect a whole population if the adults' ability to reproduce is seriously impaired. Physiological changes, such as reduced fecundity and delayed ovary development, or impaired behavioral mechanisms preventing location and identification of mate, hime, or timing of spawning can impair reproduction. Thus, although chronic exposure might not directly kill the adult, it could induce a trend of decreasing numbers that eventually could eliminate a specific portion of the population using the polluted habitat. Lack of information regarding land based development sites and critical reproduction areas precludes quantifying these effects.

Some heavier fractions of oil may sink to the bottom (Friede et al., 1972), where they remain for some time and could taint shellfish. Instances have been cited where shellfish were tainted and their marketability have been reduced by exposure to even slight amounts of oil (Blumer et al., 1970b; Wilber, 1969).

Conclusion: Salmon Species: The major impact of this proposal on salmon species would be a reduction of their populations because of a major oilspill event. Because of their habits, chinook, sockeye, chum, and coho populations would be impacted in a minor way even if a spill occurred during the outmigration of young. Population reduction cannot be quantified, although it is estimated that the results would not show, especially in the normal variation of the catch of this species.

Pink salmon populations, however, could be reduced by 100,000 to 200,000 fish because of a worst case event. Should this happen during a year of normally low populations (even years) a further reduction of these weak-year populations would carry over some years into the future. How long it would take the population to return to normal is unknown as is the total of the decline and recovery.

Crab Species: There is a possibility that populations of tanner and dungeness crab could be reduced by activities associated with oil and gas production in the proposed sale area. Egg and larval forms are most susceptible to adverse impacts from pollutant events associated with the project. Extent of impact will vary by time of year, amount and kind of event, and the area the event takes place in and covers.

The extent of population reduction cannot be estimated. Chronic pollution events covering egg release and larval rearing areas could reduce the populations of these areas substantially. The results of population reduction will show up in the commercial catch, however, because there is commercial harvest of these species. Assessment of the cause of population reduction will be difficult.

Based on oilspill trajectories and the estimate of 1 major spill during the life of the project, there is a 25-30 percent chance that 1 year class (the year of the spill) would be adversely affected. Amount of population decrease cannot be quantified, but would probably not be measurable in the commercial fishery.

Cumulative Effects: Salmon Species: Should oil be discovered elsewhere in the eastern gulf, or a tanker containing crude or refined product from Valdez cause a pollution event, little or no effect on Yakutat area salmon populations would occur because prevailing ocean currents would preclude oil from reaching and thereby affecting salmon areas. The same is true to an even greater extent for crude and refined product from Cook Inlet/Kodiak because of the greater distance that the ships remain offshore the Yakutat area.

Crab Species: The commercial fishery on these shellfish species would have the most effect on population maintenance over any other commercial venture including oil and/or gas production and shipment in the foreseeable future.

Additional impacts caused by oil and/or gas development in the eastern gulf should have minimal effects on the Yakutat crab population. It is possible that crab larvae moving west in the Alaska Current would be swept through an area of oil production. The chance of adverse effects are remote and totally unquantifiable.

A major spill from a tanker carrying oil from Valdez or in other areas described for salmon in an area of high crab larvae populations is also a possibility. Only those larvae actually coming into contact with the slick or water soluble fractions of oil in the water would be affected. The chance of a spill occurring is small and adverse impacts even smaller when the chance of crab larvae being in the area is added. In summary, although there is a possibility of cumulative impacts, the chance and effects are small and unquantifiable.

Unavoidable Adverse Effects: Salmon Species: There may be a lowering of salmon populations from 1 or 2 streams in the Yakutat area because of development site placement. Existing regulations, however, preclude anything but minor effects.

Crab Species: Effects of this proposal on the shellfish species of the area would be a reduction of population in 2 ways. A portion of 1 year class would probably be eliminated because of a major spill, and chronic low-level pollution may alter a portion of the habitat so that it is unsuitable for these species. Both effects are unquantifiable at this time.

Impacts on Birds: Of the 219 species of birds that occur in the northeastern gulf area, 111 species are primarily water-oriented; 56 species occur in offshore water, 87 species occur inshore, while 177 species live in tidal areas. For a more detailed discussion of bird resources, consult the Final Environmental Impact Statement for sale 39 (U.S. Department of the Interior, 1976).

Two major adverse impacts on bird resources of the eastern gulf coast could result from oil development activities. The most dramatic and visible impact is the oiling, dying, and littering of beaches of large numbers of birds as a result of catastrophic or chronic, low-level oil spillage from platforms, pipelines, terminals, storage facilities, and tankers. The second category is human disturbance of birds from transportation and construction activities near nesting colonies or foraging areas.

Oil Contamination: The effects of oil contamination on marine birds are well documented (Bourne, 1968b, 1970; Erickson, 1963; Aldrich, 1970). Stanton (no date) has compiled a comprehensive bibliography on the impacts of oil pollution on birds and oiled-bird rehabilitation methods; Vermeer and Vermeer (1974) have recently compiled an abstracted bibliography on the oil pollution of birds, having reviewed papers from 1922 to 1973.

Several incidents of seabird mortality caused by oilspills in the north Atlantic have been described (Bourne, 1968a, 1968b, 1969, and 1970; Bourne and Devlin, 1970 and 1971; Bibby and Bourne, 1974). Tanis and Morzer Bruijns (1968 as cited by Nelson-Smith, 1973) calculated that the total annual loss of seabirds from oil pollution in the North Sea and north Atlantic was about 150,000 to 450,000 individuals. The most widely publicized oil pollution incidents have been the Torrey Canyon and Midway oilspills which reportedly killed an estimated minimum of 7,854 and 2,778 birds, respectively. The Torrey Canyon oilspill may have killed 40,000 to 100,000 birds (Bourne, 1970). For additional oilspill effects and casualties on birds, consult the Final Environmental Impact Statement for sale 39.

The effects of oil on the plumage is that it causes the fine element of the feathers to stick together losing the insulation value and water repellent capacity of the feathers. Birds with oil contaminated plumage lose their buoyancy and flying capability becoming exposed to cold with an increasing metabolic rate, while being unable to replenish the needed energy.

Furthermore, birds become sick from ingesting oil while attempting to preen themselves. Hartung and Hunt (1966) concluded that the toxicity level of polluting oils is a definite factor in the observed bird mortality due to oil pollution. Consequently, an oiled bird dies from toxic effects, starvation, exposure, or a combination.

Estimates of bird mortality resulting from oil pollution incidents are usually low as they are based primarily on beach counts of oiled birds. Dead birds that show on beaches represent only about 5-25 percent of the total estimated bird loss. Investigators (Hope-Jones, et al., 1970) in the United Kingdom banded dead seabirds and scattered them at sea to obtain a measure of oiled birds that became beached. Only 20 percent were recovered over a 4-month period. They concluded that at least 50 percent of the bird corpses sank within 11 days of being cast at sea.

In an incident involving a die-off of cormorants off the Farne Islands in 1968, only 25 percent of the total kill was observed, while the remaining dead birds went undetected (Coulsen, et al., 1968). Tanis and Morzer Bruijns (1968) and Clark (1968, as cited by Nelson-Smith, 1973) reported that 10 percent is a reliable estimate of dead birds that show on beaches.

Some water birds that become contaminated with nonlethal doses of petroleum during the breeding season are not likely to contribute to the annual production. Hartung (1965, as reported in USDI, 1972) found that ducks, which were fed small doses of a relatively nontoxic lubricant oil, stopped laying for about 2 weeks while "controlled" ducks continued to lay normally.

Such disturbances of nesting in the higher latitudes where the growing season is short are sufficient to cause complete nesting failure among geese and

probably other birds (Barry, 1962; and Ryder, 1967, as reported in USDI, 1972).

Oil also affects the viability of eggs by reducing the permeability of the shell (Hartung, 1965). After the Torrey Canyon oilspill, breeding success in gull colonies was abnormally low (O'Connor, 1967). Rittinghaus (1956, as reported by Nelson-Smith, 1973) observed similar results in a tern colony.

Although not well documented, a serious adverse impact on birds would be a decrease of food organisms by oil pollution. According to Erickson (1963), migratory birds are indirectly affected by deposits of oil on the bottom in shallow water or along the shore that reduce the available food supply of both plant and animal matter. Various elements in the food chains are eliminated by chemical and physical properties of the oil, or items of the diet may be unavailable by being overlaid or imbedded in tarry materials.

The use of important feeding grounds has declined greatly after pollution by oil, either because of the elimination of essential food and cover, or because fouling of the habitat in other ways has reduced the attractiveness of the area. More than 20 million shorebirds, which rely upon the intertidal zones for feeding, may find them blanketed with oil.

The following discussion for oil pollution vulnerability has been taken from the Final Environmental Impact Statement for sale 39 (U.S. Department of the Interior, 1976).

The size of an oil pollution impact on the gulf's bird resources is difficult to predict because of the many variables involved; e.g., magnitude of oil spilled; type, toxicity, and location of oil spilled; season of the spill; and distribution and abundance of birds. In addition, damage is difficult to quantify because the effects may be widespread and/or difficult to distinguish from other causes of mortality (Bourne, 1970).

Because of differences in seasonal distribution, behavior, and foraging habits, all coastal and pelagic birds of the eastern gulf coast are not equally vulnerable to oiling. Most vulnerable to oil pollution are the marine species which forage by diving, plunging, or surface seizing, or those which react to alarms by diving, such as alcids, sea ducks, or larids, and procellariids (Brown, 1973; Aldrich, 1970; Bibby and Bourne, 1971 and 1972; Burnett and Synder, 1954; Dennis, 1959; Richardson, 1956; Wallace, 1971; Tuck, 1960).

Investigators in the United Kingdom observed a definite species composition of oiled birds; larids comprised about one-third and waterfowl and alcids comprised about two-thirds of the total dead birds showing on coastal beaches.

Diving or swimming species are particularly vulnerable because they react to an encounter with floating oil by diving (as opposed to flying out of the contaminated area) and quickly become totally oiled (Bourne, 1968b and 1970). In small patches of oil, swimming or diving birds could avoid coming into contact with oil, but not in the case of large slicks. Diving is a poor escape mechanism for large oil slicks.

These foraging behaviors are significant because it increases their chances of becoming oiled. There are more than 60 species of marine birds which exhibit

diving type behavior, some of which are particularly abundant in the eastern gulf coast region, e.g., larids reach numbers in excess of 1.1 million and alcids are present in numbers exceeding 1.4 million.

The more aerial and wading bird species, such as gulls, fulmars, terns, and shorebirds, react to an encounter with floating oil by flying away or are not in a position to become totally oiled (Stressmann and Stressmann, 1966, as cited by Bourne, 1968a). Therefore, they would be less likely to become oiled in reaction to alarm stimuli; however, many larids and shorebirds (northern phalarope) would still be vulnerable to becoming oiled because of foraging and roosting behavior.

More than 50 species of marine-oriented birds in the eastern gulf coast region roost on water. Those birds which roost on the water (as opposed to land) at night are more vulnerable to oiling because of their increased exposure and their increased chance of coming upon an oil slick during the night. The most abundant marine roosters in the eastern gulf are loons (170,000 in May), shearwaters (reaching nearly 50 million birds in April), petrels (over 200,000 in June), sea ducks, northern phalaropes (642,000 in May), several species of larids (over 1.1 million in May), and alcids (reaching 1.4 million in April).

Some diving species become flightless during their molt, such as alcids and waterfowl (Tuck, 1961). Some species do not fly because of social bonds with flightless young (common murre). These and other birds, which spend nearly all of their time on water, are particularly vulnerable to oiling. Those seabird species such as murres (1.2 million birds in the eastern Gulf of Alaska) and ancient and marbled murrelets, whose young leave the nest while still flightless and undergo a portion of their development at sea, are also very vulnerable.

Marine birds such as the fork-tailed petrel which forage at night would also be vulnerable to becoming oiled from an oil slick. The number of individuals of a given species affected by an oilspill depends on the total distribution, as well as the extent of the spill. A flocking species found in large concentrations in tidal, inshore, or offshore areas would be more likely to suffer greater mortality than a rare and solitary land-roosting species (Scott, 1974). In the eastern gulf, more than 40 marine-oriented bird species exhibit flocking behavior. The more abundant flocking species are the several species of larids, alcids, procellariids, waterfowl, and shorebirds. It should be noted that species as abundant as the shearwaters, while susceptible to a great mortality (e.g., 1 million birds) due to oil pollution, may not be impacted in an ecological context as greatly as the less susceptible, but less numerous species of birds.

Nesting seabirds would face a severe and immediate hazard if oilspills occur near their colony or, in the case of waterfowl, near wetlands. Seabirds tend to congregate in large rafts on the water adjacent to their breeding stations and would be highly susceptible to oiling. Waterfowl would be particularly vulnerable to oil pollution when they concentrate in the gulf's estuaries and wetlands to feed, rest, nest, or molt.

Colonial nesting seabirds would be very vulnerable during the spring and summer while they are concentrated at their breeding rookeries and utilizing pelagic foraging areas in the eastern gulf. Many of the colonial seabirds,

such as larids and probably some alcids, would also be vulnerable while wintering in offshore areas in the eastern gulf. During spring and fall, the eastern gulf is frequented by massive numbers of migrating shorebirds and waterfowl.

In summary, there are more than 60 species of marine birds that forage by diving, pursuit diving or plunging, or surface seizing. There are more than 50 species which roost on water, and over 40 species which exhibit flocking behavior.

Although there are fewer (more than 1.5 million) birds occurring in the eastern region during winter, oilspills could still cause severe damage to a sizable population of wintering waterfowl and oceanic seabirds.

Spills in identified offshore foraging areas could cause severe mortalities. Depending on the frequency of occurrence, a large mortality of seabirds could be a relatively short-term impact as annual recruitment should eventually bring the population back to pre-spill levels. If large spills occur frequently during the breeding season and in certain locations, bird resources could be severely depleted or eliminated, or could be unable to withstand competition from ecologically favored species.

Contamination of waterfowl concentration areas would probably create a more long-term impact as hydrocarbons persist in sediments for several years. For additional bird casualties and impacts on nesting birds, consult the Final Environmental Impact Statement for sale 39 (U.S. Department of the Interior, 1976).

Human Disturbance: Human disturbances to birds are associated with activities, such as vessel, aircraft, and foot traffic near seabird nesting colonies and waterfowl nesting habitat, as well as construction of offshore structures and onshore facilities near bird nesting and feeding areas. When adult seabird or waterfowl species are frightened off their nests by these causes, they leave their young vulnerable to exposure and predation. In addition, young and eggs of cliff-nesting seabird species are susceptible to displacement during hurried departures by adults. Repeated disturbance of a colony will cause adults to abandon nests (Scott, 1974).

Lights on onshore facilities and offshore platforms and vessels will attract birds, and extensive use could potentially result in the death of many birds by collisions with such structures. Collisions would be most severe in areas where structures are erected near nesting colonies or in heavily utilized foraging areas.

As with oil contamination, not all bird species would be affected to the same degree by human disturbances. Most vulnerable to vessel and aircraft noises would be colonial cliff-nesting seabird species that have exposed breeding stations. In the eastern gulf coast these species are primarily murres (2 species), cormorants (4 species), and black-legged kittiwakes.

Impacts from the presence of aircraft are directly related to the season of the year, size of the aircraft, frequency of flights, traffic patterns, and the aircraft's distance from nesting areas. The impact of vessel traffic to seabirds at their colony is directly related to frequency and how close the vessel comes to the colonies during the nesting season.

Platforms with their lights adjacent to seabird colonies or within the area between the 180-m to 1800-m contours (high density foraging area) would potentially kill many seabirds due to platform-bird collisions. The ocean surface between the 33-m to 333-m contours has been described by Isleib (1975) as a heavily utilized foraging area during late winter due to the apparent high concentrations of food items. Presumably it is heavily utilized as a foraging area year-round.

Nocturnal birds would be most susceptible by colliding with platforms and vessels. About 10 species of birds are nocturnal, including 3 species of albatross, 5 species of shearwater, and 3 species of petrel. Numbers of birds colliding with platforms or vessels would not be significant enough to impact the population, but those killed would put additional stress on the bird populations.

Conclusions: Impacts from direct oil contact on birds could range from moderate to severe depending on timing, location, quantity, and frequency of oilspills; however, the direct impact from predicted quantities of oil pollution occurring during the life of this project would have a moderate affect on bird species and populations in general for the lease area.

Impacts from chronic oil and other oil and gas related pollution on bird populations through food source contamination would have an additive affect with direct oiling of birds resulting in further reduction in bird populations where spills occur; however, these bird populations could recover provided human disturbances such as air traffic and shore development do not eliminate or significantly reduce the use of important nesting and feeding habitats.

Cumulative Effects: Impacts resulting from past OCS sales such as sale 39 and lower Cook Inlet, combined with future sales such as 46 and 60, would have minor cumulative effects on birds in the region by increasing human disturbance of bird migratory routes with an increase in air and boat traffic, as well as more shore development near nesting and feeding areas. Increased oil and gas development would also increase the chances of birds coming into contact with oilspills and contaminated food sources. Further oil and gas development could also increase the chances of bird-platform collisions.

In general, there would be some reduction and degradation of bird nesting and feeding habitats. These cumulative impacts may not be significant provided offshore and onshore development does not eliminate or reduce important nesting and feeding areas.

Unavoidable Adverse Effects: There would be some unavoidable bird mortality due to collisions with platforms and some loss of nesting and feeding habitat due to human disturbances. Bird populations would be reduced to a certain extent from direct contact with oil and contamination of food sources. Chronic pollution, alteration of habitat, and human disturbance could affect bird populations during the life of the project and for an indefinite period thereafter.

Impacts on Marine Mammals: Impacts on marine mammals would vary with the species, season, volume, and location of an oilspill; current and wind patterns; as well as location and intensity of human disturbances. Harbor seals, Steller sea lions, fur seals, and sea otters frequent the coastal areas of the

northeastern gulf. Their behavior, habitat, and population size make them more susceptible to contact with oil and human disturbance than the very mobile, exclusively marine, and generally offshore cetacean species (whales, dolphins, and porpoises).

Effects of oiling on marine mammals can be categorized as physical or physiological. Potential primary effects of oil pollution on marine mammals include matting of body pelage, irritation of skin and eyes, ingestion of oil, and contamination of breeding rookeries and hauling grounds. The most critical impact on marine mammals could be the reduction of productivity of the food web caused by acute or chronic oil contamination or physical alteration of the marine ecosystem. Very little information exists addressing the primary and secondary impacts of oil pollution on marine mammals.

What little information is available suggests that species of marine mammals respond differently to oil contamination. Observations of contaminated animals at sea or on beaches either furnish conflicting information or inadequate or inconclusive data.

Available information indicates that eye and kidney damage are among the more significant potential physical impairments to marine mammals. Thermoregulatory problems may occur to fur seals and sea otters, as a result of reduction of the insulating characteristics of fur contaminated by oil.

Smith and Geraci (1975) conducted an experimental study on the effects of immersion and ingestion of oil on ringed seals and white-coat harp seal pups. Their study provides data on the acute effects of oil pollution on ringed seals only with a short exposure to oil.

The study showed that the fouling of ringed seals did not cause medical damage and plugging of the body orifices. The study concluded that if oil were to cause thermoregulatory problems, they would occur shortly after birth.

Other seal studies in the field showed some kidney damage and liver problems. Liver damage seemed to be mild and probably reversible, but kidney damage seemed to be related to an unsuccessful attempt to either concentrate or excrete oil. The full extent of kidney damage is unknown.

Smith and Geraci (1975) found that eye damage to seals was the most significant physical impairment, and concluded that the seals' continued exposure to oil could result in severe and possible permanent eye disorders, depending on the length of exposure.

Smith and Geraci (1975) also conducted ingestion experiments to assess the effects of ingested crude oil. They found only transient enzyme release. If there was damage, it was negligible, indicating that the oil a seal might ingest was not irreversibly harmful. Furthermore, any live oil-contaminated food item would unlikely be lethal.

Preliminary results of another study on the physiological effects of oiling on fur seals indicated that small amounts of oil caused a significant increase in the metabolic rate of fur seals in water for many days after application of the oil (Gentry and McAlister, 1976).

Davis and Anderson (1976), in their field observations on the effects of oil on gray seals near Pembrokeshire, England, reported that cows appeared to locate and feed pups successfully whether both were oiled or unoiled. Oil, in itself, did not appear to preclude normal mother-pup relations. Conclusions showed that the behavior of oiled seals did not appear to differ from that of unoiled seals. However, the peak weight of an oiled pup was significantly lower than that for an unoiled pup on the beach. In addition, attempts to clean oiled pups were useless as the pups quickly became recontaminated.

Oiled gray seal pups observed on Ramsey Island (offshore Pembrokeshire), were apparently unaffected by a thick coating of fuel oil. Another observation showed that 14 oil-contaminated dead, gray seal pups were washed onshore along the North Dyfed Coast, England (anonymous, 1970, as reported by Davis and Anderson, 1976). However, information was not available to determine whether oil was or was not the cause of those deaths.

The largest recorded oil pollution incident involving the contamination of seals was in the Santa Barbara Channel off southern California in 1969. Investigations from that oilspill on certain marine mammals showed no detectable adverse impacts and showed that the number of dead animals was not abnormally high (LeBoeuf, 1971; Brownell and LeBoeuf, 1971; Orr, 1969; Simpson and Gilmartin, 1970).

However, Connell (1973) analyzed the data of Brownell and LeBoeuf (1971) on the mortality of sea lion pups and showed that the dead pups had more oil on their bodies than expected. Connell (1973) interpreted this to mean that either the dead oiled pups had picked up more oil than live pups, perhaps because the dead were washed about in the surf.

LeBoeuf (1971) stated, "The crude oil which coated weaned elephant seals at San Miguel in March and April 1969 had no significant immèdiate or long-term (1 to 15 months) effects on their health." However, LeBoeuf also concluded that, "Had the elephant seal rookery been contaminated early in the season when the females were nursing, pups might have ingested crude oil and more consequences could have ensued."

Oil apparently does not permanently damage seals if carefully removed. However, cleaning operations are not justified unless all sources of contamination are first removed. In open sea areas that are seal migration routes, seals infrequently come in contact with oil; however, when seals enter busy ship lanes, oil contamination may be more frequent.

Harbor seals and sea lions do not depend upon pelage for insulation and are not as vulnerable to the effects of oiling as are sea otters or fur seals. Contamination of breeding rookeries that are frequented by harbor seals and sea lions would be very detrimental if it occurred during the pupping season (June and July). Both adults and young animals are in danger of becoming oiled; young are also susceptible to accidental ingestion of oil while nursing.

Since pinniped rookery mortality may be density dependent, abandonment of a pupping area because of oil contamination could force animals into an already crowded rookery area or an area adjacent to the rookery which has less favorable habitat conditions. This could raise mortality rates of young seals and sea lions. Rookery abandonment from oil contamination would be expected to

last for at least 1 year and possibly longer depending on the location, extent of oiling, and providing there are no successive oilings of the rookery.

The potential then exists for a decrease in the breeding population in the contaminated region. The significance of this impact would depend upon the time period, extent of the contamination, and the number of oilings. Should the rookery recover over a period of several years, the potential exists for repopulation of the area.

There are approximately 5,000 sea otters inhabiting the northeastern gulf. Sea otters inhabit shallow coastal waters of less than 90 m, rocky coasts exposed to open oceans, offshore rocks, and kelp beds. Their primary habitat requirements are clean water and abundant marine invertebrates and demersal fish.

Sea otters are most vulnerable to direct effects of oil pollution because of their need to keep their pelage clean. To protect themselves from environmental temperatures, sea otters utilize an air blanket trapped among the dense fur fibers of their pelt for insulation; other marine mammals utilize a layer of subcutaneous fat or blubber for insulation against the elements. Contamination of the sea otter's pelt causes fur to mat and lose its water-repellent and insulative character; the sea otter dies of exposure. Fur seals could suffer similar adverse effects.

Furthermore, oil contamination of shoreline or nearshore areas frequented by sea otters has the potential to reduce the sea otter population through habitat and food source contamination.

See the following section on endangered species for impact assessment on cetaceans.

Conclusions: While direct oil contact could cause severe and possible permanent eye damage in seals, and kidney damage by ingestion, other direct oiling effects on pinnipeds are inconclusive. On the other hand, direct oiling of sea otters and fur seals can disrupt thermoregulation through matting of the fur, leading to exposure and death. Oil contamination of rookeries, shoreline and nearshore habitats, and feeding areas could have serious impacts on marine mammals by destruction or contamination of food sources and abandonment of breeding areas; however, recovery from these perturbations may occur provided cumulative and chronic effects from oil and gas development, do not eliminate or significantly reduce the use of important breeding and feeding habitats.

Cumulative Effects: Impacts resulting from the past OCS sales such as sale 39 and lower Cook Inlet, combined with future sales such as 46 and 60 could have cumulative effects on marine mammals of the region by increasing the chances that seals, sea lions, and sea otters would come in contact with oilspills, oil contaminated food, and contaminated breeding areas. Further, oil and gas development could increase human disturbance of marine mammals. Such disturbances should not be significant provided the disturbances do not significantly reduce marine mammal use of important habitats. Because of the great distance and downstream locations of such OCS areas as lower Cook Inlet and Kodiak, and the lack of a commercial discovery in the sale 39 area, it does not appear very likely that the marine mammals in the vicinity of proposed sale 55 could realistically be cumulatively impacted.

Unavoidable Adverse Effects: A certain number of pinnipeds could be affected to some extent from small oilspills and chronic oil pollution depending on the location of the spills in relation to seal and sea lion areas. Sea otters may be reduced in numbers because of oil pollution, but this impact should not be significant. Loss or contamination of food sources due to oil and other oil and gas related pollution would affect marine mammals, but the overall impact should not be significant.

Impacts on Terrestrial Mammals: Terrestrial mammals such as the Sitka black-tailed deer, moose, bears, and small furbearers, would be affected by displacement through habitat encroachment, i.e., contamination of feeding areas and possibly by direct contact with oil.

Oil Contamination: Little information is available on the effects of oil on terrestrial mammals; however, direct contact, oil ingestion, loss of feeding areas, or loss of habitat is entirely possible.

Sitka black-tailed deer which depend on sedges and kelp for winter forage, would be most vulnerable to oil contamination. An oilspill along the beaches would destroy their food source or render it unpalatable.

Winter range for deer is the most critical habitat necessary for survival of any population. Oil contaminated soil would take several years for vegetation to reestabish itself.

Black bear and brown bear fur could become contaminated with oil. Oil could also be ingested by either licking the oil off the fur or by eating oiled prey or vegetation. If oil pollution impacts the salmon fishery, the bears may be affected by loss or reduction of an important food source.

Moose, bear, and other furbearers utilize the coastal beaches for feeding or movement, and are susceptible to oil ingestion and pelage contamination. Small furbearers could die of exposure after coming in contact with oil. Their food sources could become fouled displacing the animals to possible marginal home ranges.

Habitat Alterations: An estimated 419 hectares (1,035 acres) of coastal wildlife habitat could be altered by construction of onshore support facilities.

Icy Bay and Yakutat Bay provide habitat for brown/grizzly and black bears, moose, furbearers, and small mammals. Any small mammals and furbearers that have home ranges within or greatly overlapping the construction areas would be displaced or possibly lost.

Big game is not expected to be significantly affected by the loss of this acreage. The alteration or elimination of the above acreage would not be particularly significant to wildlife in relation to either total habitat available or to total population levels; however, it would represent a continuing attrition of wildlife and wildlife habitat along the eastern gulf coast.

Increased human populations could also exert increased harassment and hunting pressures on the bear, moose, or deer populations, having a greater impact than oilspills or habitat encroachment.

Conclusions: This proposal should have minimal impacts on terrestrial mammal populations in general; however, possible accompanying development and increased human populations could further deteriorate the natural habitat reducing some terrestrial mammal populations.

Cumulative Effects: Impacts resulting from past OCS sales such as sale 39 and lower Cook Inlet, combined with future sales such as 46 and 60 are not likely to have any cumulative effects on the terrestrial mammals of the region by further displacement of mammals due to the development of onshore facilities and the degradation of habitat adjacent to development in those areas. There would also be an increased chance of direct contact with oilspills or contaminated food sources such as with bears eating oil-soaked carrion; however, these cumulative impacts should not be significant provided oil and gas development and accompanying development do not eliminate or reduce important habitat to a significant degree. Any onshore development for OCS sales 60, lower Cook Inlet, and Kodiak are many, many hundreds of miles away from the Yakutat area - in between lies not only the Gulf of Alaska but numerous mountain ranges and impassible glaciers. It is highly improbable, much less possible, that any onshore development on the Kenai Peninsula in Cook Inlet or even on some coastal area of the Island of Kodiak, which is not connected to any mainland area, could result in a significant cumulative impact on terrestrial mammal populations in the vicinity of Yakutat.

Unavoidable Adverse Effects: There could be some loss and displacement of some terrestrial mammals, and an increase in human disturbance could add to the attrition of terrestrial wildlife and wildlife habitat along the northeastern gulf coast to a certain extent; however, these impacts should not be significant.

* Impacts on Endangered and Threatened Species:

Peregrine Falcon (Falco peregrinus): Published literature indicates that essentially no peregine falcon habitat exists shoreward of the proposed lease area. An exception is the Yakutat Bay. However, if peregrines should occur there, the northernmost border of the proposed lease area would be outside the peregrine's hunting territory. The literature further cites additional peregrine habitat much further south and east of the proposed lease area. If peregrines should occur nearshore of the proposed lease area and an oilspill should occur, the likelihood of oil reaching the potential habitat is as follows: the latest USGS oilspill trajectory model indicates that the probability of spilled oil entering Yakutat Bay is 0-5 percent, while the probability of oil reaching the area north of the Malaspina Glacier is 0 percent. Furthermore, because of the Alaska Current, it is unlikely that spilled oil originating in the proposed lease area would circulate back to hit the northeastern shoreline which would provide a suitable habitat for the peregrine falcon.

Aleutian Canada Goose (Branta canadensis leucopareia): Aleutian Canada geese once bred from the eastern Aleutian Islands to the Kuril Islands. Today the only known breeding population of Aleutian Canada geese utilizes Buldir Island and appears to winter in California. (For details, consult Aleutian Canada Goose Recovery Team, U.S. Fish and Wildlife Service, no date or reference number.)

* Issue of Significant Concern

According to the U.S. Fish and Wildlife Service Recovery Plan, the precise migration route and overall use areas are still unknown. The possibility exists that the migration route passes over the proposed lease area. However, it is questionable whether the oil and gas development would interfere with the migrating geese since the proposed lease area is outside their potential feeding habitat. It is unknown whether migrants stop over near the proposed lease area. Although Canada geese feed mainly on marshland vegetation, the probability of geese encountering oil in the marshes is minimal since the latest USGS oilspill trajectory model indicates that the probability of spilled oil reaching the Yakutat area and the area north of the Malaspina Glacier ranges from 0-5 percent.

Cetaceans: The specific endangered species of whales consists of: blue whale (Balaenoptera musculus), fin whale (Balaenoptera physalus), sei whale (Balaenoptera borealis), humpback whale (Megaptera novaeangliae), right whale (Eubalaena glacialis), gray whale (Eschrichtius robustus), and the sperm whale (Physeter catodon). These whales are all of the Baleen variety except for the sperm, which is a toothed pelagic species of whale.

Although Geraci and St. Aubin (1979) show that high frequency sounds cause permanent ear damage in laboratory animals and could adversely affect marine mammals, the low frequency sounds that are likely to emanate from petroleum exploration and production are significantly less destructive. Physical adverse effects from low frequency sounds on cetaceans are unknown. However, noise does have nonauditory physical effects on birds and mammals (Fletcher,

1971). These effects appear to cause physiological stress involving hormone responses leading to lowering of disease resistance, increased vulnerability to environmental stress, and hormone imbalances which may adversely affect reproduction. Such stress-involved effects may apply to cetaceans.

Because cetaceans rely on their well developed auditory (hearing) senses for communication and respond to certain signals, even to their own detriment (Tomlin, 1955), they could experience acoustical confusion, a theoretical cause of mass strandings (Dudok van Hell, 1966). Because cetaceans and other marine mammals use sound as a form of communication or navigation, background noise from oil and gas activities in the marine environment could interfere with these communications sounds causing social disruption and echo-confusion (Geraci and St. Aubin, 1979). Whether these effects occur or not is unknown.

Noise from boat and air traffic, and from drilling and pipeline activities, could affect cetaceans that are moving through or feeding in the Gulf of Alaska.

Air and boat traffic cause a least temporary displacement and other disturbance reactions in cetaceans. Fraker (1978) observed both aircraft and boat disturbances of belukha whales while Calkins and Curatolo (1979) report that humpback whales, killer whales, and Dall porpoises are disturbed by boat traffic in Glacier Bay. However, the fact that familiar species such as gray and humpback whales, dolphins, and elephant seals along the developed California coast seem to co-exist well with human activities, Geraci and St. Aubin (1979) suggest that cetaceans may adjust to small boat and limited air traffic noise. Drill platforms are not expected to interfere with whale migration.

Direct Oil Effects: There is no evidence that cetaceans may or may not be able to detect hydrocarbon pollution, and if so, avoid it. Accounts from past oilspills show that other marine mammals such as seals and sea lions in some cases do not avoid oil, however, there has yet to be found a confirmed case of a whale, dolphin, or porpoise found coated or fouled with oil (Geraci and St. Aubin, 1979). Cetacean skin is smooth and unlikely to accumulate oil; however, unlike pinnipeds which come ashore with obvious evidence of oil, an oil-fouled cetacean may go unnoticed. Although oiled cetaceans have not been observed, the nature of their skin suggests that they may be particularly vulnerable to noxious effects of surface contact with hydrocarbons such as gas condensates (Geraci and St. Aubin, 1979). The epidermis is not keratinized, but composed of viable (live) cells (Sokolov, 1960; Geraci and St. Aubin, 1979).

In conclusion to the review of investigative research on the physiological nature of cetacean skin, Geraci and St. Aubin (1979) report that cetacean epidermis is virtually unshielded from the environment, and it may react to noxious substances, such as oil, in a manner similar to sensitve mucous membranes. Gray whales, which frequent shallow nearshore habitats, may be the most likely endangered cetacean to be fouled in cases of oilspills accumulating in nearshore areas.

Cetacean vulnerability to oil ingestion varies with species, type of oil, and nature of the oilspill. Baleen whales such as blue, fin, and humpback whales could accidentally engulf large quantities of oil while catching food concentrations that may be present in an oilspill area. In this case, most of the oil engulfed would probably be forced out of the mouth during the feeding process, however, oil coating or fouling of the baleen plates could occur. Studies in progress have demonstrated that oil causes matting of the baleen fringes which reduces filtering efficiency (Braithwaite, personal communication). Other baleen whales, such as right and sei whales, which skim the water surface covering relatively large areas while feeding may be the most vulnerable to baleen fouling and oil ingestion in the case of surface oil pollution. The effects of oil ingestion on whales is unknown.

The bottomfeeding gray whale is unlikely to ingest surface oils, but could be prone to ingestion of hydrocarbons in the sediments of neashore areas contaminated by acute or chronic oil pollution. Tomilin (1955) reports that cetaceans, especially benthic feeders, have a poorly developed sense of taste, and the presence of foreign bodies in cetacean stomachs attests to this. Thus, evidence indicates that whales may not ba able to differentiate between hydrocarbon contaminated and uncontaminated food.

Inhalation of oil or oil clogging in the cetacean blowhole is unlikely as the typical breathing cycle of cetaceans involves an "explosive" exhalation followed by an immediate inspiraton and an abrupt closure of the blowhole (Geraci and St. Aubin, 1979; Tomilin, 1960). This process prevents inhalation of water and should be as discriminatory of oil, however, toxic hydrocarbon gas could be inhaled. The effectiveness of the inhalation process to avoid the uptake of oil would depend on the quantity and chemical properties of the oil.

Indirect Oil Effect: The greatest potential indirect impacts from oil and gas activities on cetaceans would be the possible destruction or contamination of critical food sources from acute or chronic oil pollution.

In discussions of the endangered baleen whales' food sources, it was pointed out that most of these migratory whales (blue, fin, gray, and humpback whales) are probably seasonal feeders. These species rely almost entirely on the abundant food sources of the Gulf of Alaska, Bering Sea, and Arctic Sea for nourishment, and live off the stored blubber reserves while migrating and while in their winter range (Wolman, 1972; Rice and Wolman, 1971; Gilmore, 1959).

Euphausiid and copecod crustaceans are important food of fin, blue, sei, and right whales (especially blue and right whales), while benthic amphipods are an important food of gray whales. The widespread destruction or contamination of these food resources from hydrocarbon pollution would adversely affect the associated whale species forcing them to enter their wintering areas during the following season in a lean and possible stressed condition. Such a condition could cause significant reproductive failure and increased mortality. Localized reduction of invertebrates as a result of spills may only create temporary food losses for whales.

Although there is a low probability of an oilspill occurring, such an occurrence would add stress to an endangered or badly depleted whale population. The blue whale and right whale are probably the most endangered whale species found in the Gulf of Alaska. These species are also "restricted feeders" preying on only a few species of plankton. Thus, the blue and right whales probably have the lowest tolerance to increased stress and mortality. The loss of only a few additional whales may reduce these species populations below the level of environmental tolerance.

Conclusions: Because of the general absence of suitable peregrine habitat and the 0-5 percent probability of oil reaching any such potential habitat, it is not likely that oil and gas activities would jeopardize the continued existence of the peregrine falcon. In addition, because the probability of geese encountering oil slicks near feeding habitat is low, it is unlikely that the continued existence of Aleutian Canada geese would be jeopardized.

Although noise can be damaging to marine mammals, the low frequency sounds emanated by oil and gas activities have not been proven to adversely affect cetaceans. Boat and air traffic will temporarily disturb cetaceans, but the co-existence of whales, dolphins, and other marine mammals with human activities suggest that at least some species of cetaceans are able to adjust to such disturbance.

Direct oiling is unlikely to be a problem with cetaceans because their smooth skin surface should not allow oil to accumulate; however, their skin is sensitive and perhaps permeable to toxic hydorcarbons.

Oil ingestion and baleen fouling is a potential problem for all baleen whales with surface pollution most likely to affect skimmer feeders such as sei and right whales, and with bottom sediment hydrocarbons most likely to affect gray whales.

The reduction or contamination of critical food sources due to oil pollution is the major potential indirect effect on cetaceans. The significant reduction of plankton populations in the gulf as a whole from an oilspill is highly unlikely.

However, the localized and temporary loss or contamination of food sources in important feeding areas could contribute to adverse environmental stress on badly depleted whale population.

Cumulative Effects: Earlier exploration in sale 39, future exploration and development in Kodiak and Shelikof Strait, combined with sale 55, could exert additional stress on the individual endangered whales, or their habitat, to adversely effect the well being of these endangered species. TAPS tanker and commercial fishing activities also might contribute to cumulative effects. Additional boat and aircraft traffic may cause temporary or permanent displacement of certain endangered species. Such impacts may be most significant at passes and other restricted migration corridors used by cetaceans. However, sale 39 was dry, i.e., no oil production; therefore, no oilspill potential; therefore no potential cumulative impact on endangered species. If oil were discovered and produced in lower Cook Inlet and on the Kodiak shelf, there is a viable possibility of an oilspill which could, at the right time and place, affect some unknown portion of the population of endangered whales. In this respect, there is some potential for long-term unknown cumulative population effects even from widely dispersed OCS lease areas because the same species o whales generally follow the same migration routes each year.

Unavoidable Adverse Effects: Based on the worst case assumptions the endangered whales could be severely affected. However, the lack of scientific data precludes quantitative or qualitative assessment of positive or negative impacts of oil and gas development on the endangered whales. Consequently, it is impossible to identify unavoidable adverse effects of oil and gas development on the endangered whales.

Endangered Whales-Worst Case Analysis: The following discussion is in response to the new CEQ Regulations which require a worst case analysis where certain information is incomplete or unavailable. The worst case for the endangered whales addresses a scenario which draws from hearsay, subjective judgments, and assumptions whose statistical validity is sometimes unknown. The following determinations have been made for endangered cetaceans in general, and specific probabilities may vary with the species. All of these endangered whales ar of the baleen type except for the sperm whale which is toothed. The sperm whales are pelagic species which inhabit the deep ocean beyond the continental shelf and the shelf break is in areas outside of the proposed lease area. Humpback whales, which are Baleen types, have been seen on the Fairweather grounds fishing area south and outside of the proposed lease area. The purpose of a BLM/NOAA OCSEAP study entitled, "Habitat Use by Humpback, Gray, and Fin Whales in the Gulf of Alaska" will be to attempt to determine spatial and temporal distribution of humpback whales in the Gulf of Alaka (from Fairweather grounds to and including Prince William Sound). This research will also attempt to establish patterns of summer movements and habitat use which are needed to evaluate the location of critical areas (feeding, rearing, and staging) for these species in the Gulf of Alaska. Therefore, the following worst case analysis is primarily applicable to the Baleen variety of endangered whales. The toothed sperm whale inhabits the deeper ocean beyond the proposed lease area and continental shelf break is more generally covered by the following analysis. The Biological Opinion by the National Marine Fisheries Service, although close to completion, has not been released in time for this FES.

Those assumptions and the analyst's judgment on the probability of the assumption being correct are as follows:

Worst Case Assumptions Population is at its lowest.	Probability of Assumption Being Correct High Level
1) The endangered whales' migration route would take the immature whales through or near the proposed lease area. During migration, females with calves would be present in or near the lease area.	Medium-High
2) Mature whale bulls occur in or near the proposed lease area.	Medium
3) A large spill would occur during the migration period.	Low
4) The platforms would exist for 37 years.	Medium
5) Noise would interrupt and displace feeding whales and interfere with migrating whales in or surrounding the lease area.	Unknown
6) Noise would interfere with whale communication.	Unknown
7) Endangered whales would feed in or near the sale area during the spring and fall migrations.	High
8) Endangered whales would feed in or near the proposed sale area during the summer.	High
9) Oil contaminated baleen would interfere with feeding, at least temporarily.	High
10) Oil on the endangered whales' skin would affect cutaneous respiration.	Unknown
11) Oil and other contaminants could affect cetacean food sources on a localized short-term basis.	High
12) Oil and other contaminants could affect cetacean food sources on a long-term basis over a regional size area.	Unknown
13) Platforms in the lease area would divert migrating whales.	Low
14) Endangered whales would encounter large oil slicks during the 37 years of operation.	Low
15) Endangered whales would encounter 1-2 large oil slicks during the 37 years of operation.	Low

16) Whales would be exposed to developmental activities such as small spills, chronic events, and any combination thereof. High

17) Oil could be taken into the blowhole. Unknown

18) Presence of toxic compounds originating from mud and drill cuttings would build up in the whales' food chain and/or tissues. Low

The following is a speculative assessment of the worst possible case for a large volume, continuous oilspill which could interact with migrating whales. The statistical probability of the following is extremely low.

° A blowout on a production well occurs outside the casing and exits at the surface close to the drilling rig. Assume a 2,000 bbl/day blowout continuous for 60 days.

° There is no fire (and therefore released oil remains within the marine environment).

° The blowout occurs in spring or fall during endangered whale migration through the area.

° It will take 4 months to mobilize the rig, crews, location, drilling time, and completion process to completely shut down the blowout well by relieving the reservoir pressure with a relief well.

° During summer, spill cleanup procedures could function near maximum efficiency because of periods of calmer sea states.

° Cleanup efficiency will decline during the fall and be minimal during the winter.

Using these worst case assumptions, a combination of these has been made which constitutes a worst case scenario. Although such a scenario might be considered plausible, it is our judgment that it is an improbable event. A summary of such a scenario with resulting impacts is as follows:

A very large spill (total of 120,000 bbls) that is continuous (60 days) occurs at the beginning of the endangered species migration period.

Assuming that spilled oil is in the path of spring or fall migrating whales, an unpredictable number of the whales could be exposed. The oil could also eliminate food sources, stressing the population further by weakening the whales in their migration. Endangered whale populations that are unduly stressed by environmental and man-made factors could become more susceptible to a host of limiting factors, thereby negatively impacting standing crops and/or reproductive capability.

Oil in the water could clog the pores of the whales' skin, preventing cutaneous respiration and transportation of substances needed by the physical requirements of their living skin. However, this assumes no behavior modification, e.g., whales will not be able to avoid oil in water contact.

Assumed toxic substances could accumulate and concentrate in the whales' prey and in the prey's food chain. However, it is unknown whether such concentration would negatively impact population density of endangered species. Also, it is unknown how much any individual spill would contribute to the long-term accumulations of toxic substances.

Exploration related noise and traffic may interfere with the whales' northwest migration past the platform area.

Oil slicks could reduce the whales' food sources, thus not satisfying their nutritional requirements. A reduction in nutrition would weaken the whales for their migration and force them to enter wintering areas in a lean state.

In conclusion, a plausible (but, in our judgment, highly unlikely) combination of oilspill events could occasionally impact an unknown number of the season's migrating endangered whale population. If we take for granted that all physiological impacts are detrimental, the preceding scenario could temporarily reduce the endangered whale population. In addition to the oilspill scenario, general activities throughout the lease area could expose, on a continuing basis, a larger percentage of the population to impacts such as interfering with migration, feeding, etc. Although not perhaps as potentially lethal as catastrophic spills, such impacts could be significant on a cumulative basis.

b. Impacts on the Affected Social and Economic Environment:

* Impacts on the Lifestyle of Yakutat: One of the primary causes of concern to the people of Yakutat is that the exploration and production of oil and gas in the area will lead to a dramatic increase in population, decrease in subsistence gathering, and changes in the current lifestyle. The City of Yakutat is well aware of possible impacts, and with these and other concerns in mind, Yakutat has developed the Yakutat Comprehensive Development Plan, Alaska Consultants, 1976, and the City of Yakutat Capital Improvements and Services Program, Alaska Consultants, 1978.

The State of Alaska, the City of Yakutat, and the Yak-Tat-Kwaan, Inc., the Yakutat Native Village corporation, effectively control the available land in the Yakutat area, either by direct ownership (see sec. II.C.7 and III.A.2.b., Impacts on Land Status) and/or zoning powers. It is assumed that these organizational entities, with the cooperation of the oil and gas companies, would cause all exploration personnel, less the individuals employed from Yakutat, to live in enclaves which the companies would need to construct. All developed land in the vicinity of Yakutat is assumed to be annexed by the city at the outset of OCS development. It is further assumed that during potential development and production phases, these organizational entities will significantly influence impact on community lifestyles which occur by directing oil industry-community interactions, business relationships and other contacts. Since these interactions, relationships, and contacts vary under different enclave assumptions, the following discussion treats variations in enclave isolation and its potential consequences separately.

Full Enclave Case: The enclave approach to the development of petroleum-related onshore facilities assumes physical and social separation from existing communities for the specific function of housing petroleum workers. For the purposes here, a living space compound is expected to be separated from Yakutat

* Issue of Significant Concern

and contain at least group living quarters (as opposed to family housing), dining and recreation facilities, and self-sufficiency in public utilities, emergency medical services, fire fighting, and compound security. Although interaction with the community is discouraged by a living space compound, moderate interaction potential exists if local vendors procure catering and other supplies and local labor is used for compound operations and maintenance.

In addition to the operational needs of such a compound, potential human interactions with the community exists in terms of increased demand on community transportation facilities, business establishments and fish and wildlife resources beyond that imposed by resident population.

On the basis of the full enclave assumption, the future population of the Yakutat road-connected area should have little or no increase other than the projections listed in the non-OCS case on table III.A.2.b.-1. Furthermore, if labor and management practices and agreements maximize work-hours per day and per week, provide suitable amenities at the camp(s), and facilitate transportation outside the Yakutat area for time off, impacts could be greatly minimized.

There could be impacts on Yakutat, although many of them are difficult or impossible to predict with certainty at this time. Impacts on the projected capital improvements (table III.A.2.b.-2) should not strain the capabilities of these improvements. Local government should profit from added property tax revenues and ad valorem property tax base for the construction of such projects. Local government itself would be impacted by the need to negotiate agreements with industry and review site-specific plans for onshore facilities to assure consistency with the comprehensive development plan and implementation policies.

The streets and highways of Yakutat would be expected to undergo increased traffic volume as well as increased use by heavy equipment transports. Heavy equipment could be expected to be off-loaded at the existing marine service base dock. The extent of increased use of the existing city-owned dock would depend on the extent to which local vendors serve enclave needs and other contractors are unable to use the service base facilities. The airport would experience increased usage from business contractors, rotated OCS personnel, and high-value-to-weight cargo.

Use of other community facilities and services is assumed to be minimized, producing a relatively benign and limited interaction between transient workers and local residents. To the extent that these interactions are transient and limited, it is assumed that their permanent influence on community lifestyles would also be small. If a full 10 percent of local workers are employed by the OCS economy, the social effects of these workers' work experience could be expected to have a ripple effect on their family and community relationships, encouraging new ideas, behaviors, and cultural practices consistent with industrial employment. So long as the proportion of local workers accepting OCS employment remained small, changes introduced to the community through these workers would be gradual and moderate.

The isolation of the enclave and its self-contained dining, recreational, and medical facilities would suggest minimal purchases locally. If, over time, the degree of isolation of the enclave were relaxed by industry-community agreement, one could expect increased demand for medical, recreational and commercial enterprises heretofore uneconomic for such a small community. It

is likely that some of these amenities would be welcomed by local residents, as the 1975 survey by Alaska Consultants indicates. On the other hand, relaxation of community-enclave boundaries could lead to increasing conflict over fish and game regulation and utilization, increased personal contacts between workers and town residents and the indirect encouragement of immigration by OCS worker families who might chose to live in Yakutat. These changes, coupled with an assumed 10 percent local hire by OCS related industry might gradually transform community lifestyles in Yakutat to a more urban form. Relaxation of the boundaries could also be expected to require increases in law enforcement, social services, schools, housing, and related utilities to handle the increased demands.

Partial Enclave Case: A partial enclave case is described here by way of showing the potential range of possible impacts on Yakutat. The basis for the discussion is found in Technical Memorandum 2, Northern Gulf of Alaska Statewide and Regional Population and Economic Systems Impact Analysis, ISER, pp. 37-42. The partial enclave case assumes the service base for development of the Northern Gulf OCS is located in Yakutat. The primary source of potential impact on Yakutat are the dependents assumed brought to the community by operations sector employees. Development sector immigrant population is assumed to be housed largely in an industrial enclave and thus not contribute significantly to Yakutat's total population for residential service demands. For the purposes of this cases, all permanent area residents within and in the vicinity of Yakutat are counted in the population base, following the assumption the City of Yakutat will annex all developed land at the outset of OCS development.

Using averages for 5-year periods, as shown in table III.A.2.b.-1, the OCS-related population for the initial impact period of 1981-85 comprises an enclaved development phase population of 70 and a non-enclaved operations phase population of 190, the net effect of which is to increase the Yakutat area population by 30 percent to about 830 persons. The peak population impact is projected to occur in the 1986-90 period, with a total OCS-related population increase of almost 800, about half of which would be composed of operations sector employees and dependents living in Yakutat. The non-enclaved population increase during this peak period would increase the population of the Yakutat area by 52 percent to a total of about 1,140. This period of accelerated growth is likely to be the most difficult period of growth management experienced in Yakutat.

Beyond 1990, the enclaved development population is expected to decline dramatically, terminating the need for a development phase enclave. The non-enclaved operations sector population, however, is projected to peak at 590 persons during the 1991-95 period and stabilize at a comparable figure beyond that. This non-enclaved OCS related population would account for some 40 percent of the Yakutat area population during the 1991-95 period, probably assuming a gradually declining proportion of total population thereafter as other economic sources contribute to total population.

Residential Land: The amount of residential land necessary to accommodate OCS related personnel is estimated from the standards used to project such demand in the non-OCS case (Appendix to TR 33, Alaska Consultants). The enclaved population from the development phase are assumed housed as part of the service base. The land necessary for the service base and other industrial uses is assumed the same as in the case involving the full enclave assumption.

Table III.A.2.b.-1

Population (Mean Case)

Year	OCS-Related Population: Development Phase	OCS-Related Population: Operations Phase (1)	Area (2) Base Population	Yakutat Population (1) & (2)	Percent Increase
1976-1980:	0	0	604	604	0
1981-1985:	70	190	639	829	29.7
1986-1990:	406	390	746	1,136	52.3
1991-1995:	0	590	877	1,467	67.3
1996-2000:	0	585	934	1,519	62.6

Source: ISER, TM2, 1979; Alaska Consultants TR 33, 1979; Alaska OCS Office.

Using an average family size of 3.1 persons per household, table III.A.2.b.-2 shows families to be accommodated in Yakutat would grow from about 60 in the 1981-85 period to a peak of some 190 families during 1991-95. Ten percent of the dwelling units for these families are assumed contained in multiple-family structures at a density of 15 dwelling units per acre. The amount of acreage to accommodate apartment structures would range from 0.4 acres in 1981-85 to 1.3 acres in the 1991-95 period.

By far the largest amount of land would be required for single-family dwellings, assumed to apply to 90 percent of the OCS related dwellings, a density and style of housing in keeping with the predominant single-family dwelling character of housing existing in Yakutat. Single-family structures are assumed to have an average lot size of 7,500 square feet, producing a density of four dwellings per residential acre. Lot size would be determined by location and other factors and controlled by local ordinance. Using this housing density, there would be the need for 13.7 acres of land in the 1981-85 period, expanding to a total of 42.7 acres in 1991-95 for single-family dwellings. The combined multiple- and single-family dwelling acreage requirements would range from 14.1 acres in 1981-85 to 44.0 acres in 1991-95. Translated to net residential acreage, assuming street rights-of-way comprise 28 percent of total residential acreage, this produces a total amount of land used for residential purposes ranging from about ten acres in 1981-85 to about 32 acres in the peak period of 1991-95.

The net effect of such change in the 1981-85 period would be to add a third the amount of land used residentially in Yakutat (see table III.A.2.b.-2) and double residential acreage from the present case during the 1986-95 period. An additional 12.3 acres would be added to the land use inventory during peak housing demand for residential street rights-of-way.

Public Utilities: The services required for such a massive infusion of new residents to a community the size of Yakutat would severely strain the capacity of existing community facilities and services. The capital improvement program for Yakutat would require extensive overhaul to reflect the added population and the specific effects on existing facilities and services. Again, the standards used to project the effects of the non-OCS case (TR 33, Alaska Consultants) are the basis for estimating needed public facilities and services for OCS related population.

Some degree of the extent of such capital improvement revisions is reflected in the potential added demand for basic public utilities to accommodate new residents, as shown in table III.A.2.b.-3. The added daily domestic water use, assuming daily per capita use of 125 gallons, would increase by 23,750 gallons in 1981-85 to 73,750 gallons in the period 1991-95. Although water supply sources in Yakutat may be adequate to meet such demand, considerable capital outlay would be required in a relatively short period of time to plan and install the water distribution system necessary for new residential lands.

Residential development would also be the primary source for needed improvements in sewage treatment facilities. The added water usage would require an added peak load (three times normal usage) sewage treatment capacity twice the design capacity of the present system during 1981-85 and seven times this capacity by the period 1991-95. Sewage needs would depend on the layout of residential development and the capacity of existing trunk lines. Since the sewer and water systems in Yakutat have been largely Public Health Service

installations designed for residential service, other sources of finance would be required for OCS related inhabitants. Industrial on-shore facilities would likely be encouraged to establish self-sufficiency in such utilities should industrial needs exceed local supplies and facilities.

The combined population for enclaved construction personnel and in-town operations residents is the basis for estimating increased electrical demand, assuming electrical generation for industrial purposes is provided by industry itself. Under these circumstances, 780 kilowatts (kw) of new installed capacity (3.0 kw per person) would be required during 1981-85, increasing to 2,388 kw during the 1986-90 period and stabilizing at around 1,750 kw thereafter. The additional peak period electrical demand in 1986-90 would approximate the existing peak power capacity (2,025 kw) and about double the firm power capacity (1,225 kw) installed by the private electric power company in Yakutat. Electrical distribution needs would depend on the layout of residential development and the capacity configuration of the existing system.

Education Facilities: As shown in table III.A.2.b.-4, twenty percent of the non-enclaved OCS population is assumed to be of school age in grades K-12. Using a 60/40 ratio of K-6 to 7-12 grade students, the increased population in the initial 1981-85 period would have 23 students in grades K-6 and 15 students in grades 7-12, requiring the equivalent of about one additional classroom in each of the grade ranges. Accordingly, additional classroom requirements would increase by the equivalent of about one new classroom for each grade range for the next two successive time periods, stabilizing at a total of about three classroom equivalents in each grade range beyond 1996.

Other Public Facilities and Services: The population increase from OCS related activities can be expected to have comparable effects on an array of public facilities and services in Yakutat as well as on the capacity of local government to expeditiously cope with accelerated growth. Construction, operation and maintenance activities would be affected with such community facilities and services as transportation, communication, solid waste disposal, public safety, health and social services, recreation and local government. The city dock may receive more intensive use from serving the needs of commercial vendors in Yakutat that provide goods and services to the industrial enclave and should receive more intensive use to serve the demand for goods and services generated by the increased resident population. Airport use may be the same as or less than the full enclave case, depending on the mix of demand between increased family use and increased use to accomplish employee rotation. Road system use demands may behave comparably depending on the mix of private and common carrier vehicles. Demands on the communication system should be comparable to or less than the full enclave case. The increased resident population will place added demand on local government for solid waste collection and disposal, police and fire services, recreation and health and social services. Industry is assumed to provide the latter services for enclave residents while in the compound, but Yakutat can be expected to undergo some consequences of exported demand for police services, jail facilities, health and social services and hunting and fishing forms of recreation. The net effect of the totality of demands on local government would be to thoroughly change the scope and scale of city operations and seriously strain the ability of local government to plan, budget, bond and obtain needed public facilities and services in a relatively short period of time.

Table III.A.2.b.-2

Mean Case
Family Housing and Residential Land

Year	Non-Enclaved Pop. (1)	No. (2) Families	Apt. Units		1-Family Units		Total Res. Acreage	Total Net Res. Acreage	Total Street ROW
			No. (3)	Acreage (4)	No.	Acreage (5)			
1976-1980	0	0	0	0	0	0	0	0	0
1981-1985	190	61	6	0.40	55	13.75	14.15	10.19	3.96
1986-1990	390	126	13	0.87	113	28.25	29.12	20.97	8.15
1991-1995	590	190	19	1.27	171	42.75	44.02	31.69	12.33
1996-2000	585	189	19	1.27	170	42.50	43.77	31.51	12.26

(1) Operations phase population.
(2) Based on a family size of 3.1 persons per family.
(3) Assumed to be ten percent of the housing stock.
(4) Based on a density of 15 dwelling units per acre; multiply by 0.0405 to obtain hectares.
(5) Based on a density of four dwelling units per acre.
(6) Assumed to comprise 72 percent of total residential acreage, with residential street rights-of-way consuming the remainder.

Source: ISER, TM 2, 1979; Alaska OCS Office.

Table III.A.2.b.-3

Mean Case
Basic Public Utilities

Year	Non-Enclaved Population (1)	Water Supply (in gallons) (2)	Sewage Treatment Capacity (in gallons) (3)	Total OCS Population (4)	Domestic Electric Needs (in kw) (5)
1976-1980	0	0	0	0	0
1981-1985	190	23,750	71,250	260	780
1986-1990	390	48,750	146,250	796	2,388
1991-1995	590	73,750	221,250	590	1,770
1996-2000	585	73,125	219,375	585	1,755

(1) Operations phase population.
(2) Assumed 125 gallons per capita per day; multiply by 4.545 to obtain liters.
(3) Assumed three times daily per capita water use; multiply by 4.545 to obtain liters.
(4) Development and operations phase population combined.
(5) Assumed three killowatts per capita daily need.

SOURCE: ISER, TM 2, 1979; Alaska OCS Office.

Table III.A.2.b.-4

Mean Case
Education

Year	Non-Enclaved Pop. (1)	Total (2) Number Students	Number Students		Number Classrooms	
			K-6 (3)	7-12 (4)	K-6 (5)	7-12 (6)
1976-1980 :	0	0	0	0	0	0
1981-1985 :	190	38	23	15	0.9	0.7
1986-1990 :	390	78	47	31	1.9	1.5
1991-1995 :	590	118	71	47	2.8	2.3
1996-2000 :	585	117	70	47	2.8	2.3

(1) Operations phase population.
(2) Assumed 20 percent of the population.
(3) Assumed 60 percent of the student population.
(4) Assumed 40 percent of the student population.
(5) Based on a classroom size of 25.
(6) Based on a classroom size of 20.

Source: ISER, TM 2, 1979; Alaska OCS Office.

The demands on city government of a partial enclave case would be mirrored in other areas of community social organization and lifestyles as well. With the onset of boom town growth conditions in the early 1980's, one could expect growth in the number and variety of commercial enterprises catering to increased demands for medical and dental care, personal services such as barber and beauty shops, building and hardware stores, banks, and general merchandise outlets. With increasing population, particlarly of families with small children, the need for a locally available hospital faclity would no doubt receive added support. If local outlets of OCS support industries were established to cater to locally felt demands, additional office space, housing, and motel facilities would be encouraged.

With additional private housing demands over a relatively short time period, short term accomodations such as motel, modular or trailer housing would be encouraged, thereby altering the visual character of current residential housing. The addition of trailer housing in the short term might also introduce additional fire risks that would require expansion of the City's present volunteer fire department.

Increased hunting and fishing pressure locally could affect local resources encouraging more competition. The higher incomes of OCS workers might in turn give them a competitive advantage in the procurement of locally available resources, thereby reducing the viability of local resident subsistence activities.

Impacts on families and individuals would also be moderate to severe under boom conditions. Particularly during the 1991-95 period, with the rapid introduction of 190 OCS-related families, pressure on existing lifestyles would increase. Noise and visual pollution during housing and local utilities expansion and construction would add to personal and family stress levels. One could expect increasing incidences of crime, alcohol abuse, family tension, and conflict and perhaps increasing mortality associated with stress-related illnesses during this peak construction period. The quickening of economic activity and the increase in available commercial, recreational, and social interaction opportunities might also encourage expansion of local clubs and organizations, university and local classes catering to intellectual and practical tastes, additional chruches, bars, restaurants, and other recreational facilities to accommodate expanding needs.

The increasing scale and complexity of economic, political, and social organization required under this partial enclave case would fundamentally alter the quiet, fisheries-based lifestyle of present-day Yakutat. In itself, this alteration could be interpreted as both positive and negative. Certainly the benefits to community in the form of increased services, variety of recreation, locally available medical care and commercial goods would be considered positively by most local residents. Increased economic opportunities might also encourage migration back to the community of local youth pulled away by outside economic opportunities. The reduction in the isolation of the small town would erode current sources and levels of social and political control encouraging new leadership, redistributions of power and influence. New children in the schools would facilitate new programs held off by size constraints.

Response to these changes by community residents might range from withdrawal from community institutions and interactions or migration from the community in extreme cases to various levels of personal, family and community stress. The most acute stress would be felt by the city government itself, in managing the growth during boom conditions.

Conclusion: If the assumption of an enclave style of development is enforced, then overall impacts on the lifestyle of Yakutat would be significantly moderated. If, however, the enclave assumption is not implemented adequately, then the impact of onshore facilities construction and operations could be most severe on the lifestyle of Yakutat. The level of potential impact on the lifestyle of Yakutat hinges on the choice by the community of the desired level and method for accommodating OCS related population and industrial facilities in Yakutat, and continuous planning to assure these choices.

Cumulative Effects: The additive effect of the proposal, taking into consideration the possibility of increased commercial bottomfishing and processing activities, increased tourism and recreational activities eminating from National Monuments or d-2 designations, increased timbering, as well as unforeseen local commercial development projects in Yakutat, would result in moderate impacts on the lifestyle of Yakutat under the full enclave assumption. Such additive effects locally would be severely compounded if the enclave concept were not adequately implemented. Cumulative effects due to OCS lease sales depends on sales 39, 60, lower Cook Inlet, and 46 on the Kodiak shelf. Sale 39 was dry, i.e., no oil discovered, and thus no chance of cumulatively affecting Yakutat's lifestyle. OCS lease sales in lower Cook Inlet and Kodiak are over 500 miles away beyond nmerous mountain ranges and glaciers as well as the entire Gulf of Alaska in which the general current circulation of the Alaska Stream is from east to west. Any onshore development for lower Cook Inlet would probably be somewhere along the coast of Cook Inlet, and similarly, somewhere along the Kodiak coast. In neither case would any onshore development depend upon the use in any way of the community of Yakutat. Yakutat is simply too far away from lower Cook Inlet or Kodiak to be of any facilities use for those areas. In addition, an oilspill in either Cook Inlet, with its 30 foot tides, high energy, and strong currents, or on the Kodiak shelf with the Alaska Stream moving westward, is not very likely to traverse over 500 miles of turbulent water in the Gulf of Alaska to impact Yakutat Bay.

To summarize, the physical circumstances for OCS sales in either Cook Inlet or Kodiak are not likely to have a cumulative effect on the lifestyle of Yakutat. In local OCS history, this lease sale builds on community solidarity and adaptability partially created by sale 39 by which Yakutat can deal effectively with rapid energy development.

Unavoidable Adverse Effects: If enclave development is adequately implemented by all concerned parties, then the unavoidable adverse effects on the lifestyle of Yakutat will have been moderated.

* Impacts on the Local Economy of Yakutat: In the sections below the impact of the proposal on the Yakutat are considered minor and are therefore presented in Appendix D.

* Issue of Significant Concern

In order to estimate a most likely economic impact on Yakutat of Eastern Gulf petroleum development, it has been necessary to forecast how much of the petroleum development employment will be isolated in employment enclaves and how much will be located within the town. In order to make this forecast those familiar with scoping process in Yakutat were consulted concerning the desires of the community and the capacity of the community to control the development which occurs. Those familiar with the scoping process indicated that Yakutat would like to retain its present fishing village lifestyle but with larger revenues to improve this lifestyle, and they indicated the local governmental units probably have sufficient ownership of the land around Yakutat to control development to a desired degree of economic isolation.

Given this situation, our most likely representative case assumes that Yakutat will guide development to ensure the continued lifestyle of the fishing village in the face of a very large petroleum development in the local area. In particular, we use as our most likely representative case, a situation where Yakutat will use its control of the land needed by petroleum development to achieve the following control: (1) petroleum companies will agree that all nonlocal employees will be required to remain in a petroleum industry living enclave; (2) petroleum companies will agree that these employees will not recreate, etc. in Yakutat, but will rotate out; (3) local hiring will be limited to a nondisruptive 10 percent of local employment and will be limited to long term residents; (4) local hiring will be limited to hiring in non-disruptive skill categories, e.g., no hiring of the waterworks mechanics, etc.; (5) other petroleum activities such as purchasing, etc., will be of a nature as not to be disruptive of the local economy; and (6) local government will not create local boom conditions with a spending spree of new tax revenues.

Thus our most likely assumption is that Yakutat will reach agreement with the petroleum companies to guide petroleum development impacts in Yakutat to non-disruptive magnitudes and thus development will not transform the current small, largely native fishing village.

While it seems to us that several examples of a similar type of controlled development already exists in Cook Inlet and North Slope Alaska and that this assumption is therefore reasonable. There are technical and local political factors which might cause this forecast for nondisruptive development to be wrong.

Thus there is in reality a range of possible outcomes in terms of economic isolation of petroleum development acitvities and to reflect this range we have included a second less likely representative case where only the development or construction workers are enclaved and the operations employees live in Yakutat with their families. Thus we present two cases and implied range between them in order to realistically capture future prospects if development occurs.

Full Enclave Case: Under full enclave conditions, the future employment breakdown in Yakutat in the mean petroleum development scenario is shown below. Total Yakutat local employment rises, as in the no-sale case, from 301 in 1980 to 519 in 2000. In this development case, 10 percent of these local employees move from other employment to the petroleum sector. Local petroleum employment, therefore, rises from 0 in 1980 to 52 in 2000 as shown in column (3). Similarly, employment in the local non-petroleum sector (column 2) rises

from 301 in 1980 to 467 in 2000 and is less in each year than in the base case. As shown, enclave/offshore employment is, as shown in column (4), 200-300 during most of the period, rising to a temporary peak of 896 (not shown) in the 1987 construction period. Thus, total employment in the Yakutat area rises from 301 in 1980 to 735 in 2000 with a temporary peak in the mid-1980's. Local non-enclave employment is however, as in the no-sale or base case.

Yakutat Employment Forecast with the Proposal
(mean case development)

	(1) Base Case Local Employment	(2) Yakutat Non-OCS Local Employment	(3) Yakutat Local OCS Employment	(4) Enclave and Offshore Employment	(2)±(3)±(4) Total Employment
1980	301	301			301
1985	365	328	37	211	---
1990	439	395	44	317	756
1995	501	451	50	218	719
2000	519	467	52	216	735

Source: 1) Base case employment from Alaska Consultants and no sale case
2) Local petroleum scenario employment from BLM/Alaska OCS estimate

These estimates exclude non-local based employees and differ slightly in calculation from similar ISER figures cited in partial enclave sections.

In interpreting the impact of this employment forecast on the Yakutat economy a number of factors need be considered. These include: 1) the stimulative impact of local OCS employment; 2) the impact of reduced non-OCS employment compared to the base case; 3) the impact of local petroleum industry purchases; 4) the stimulative impact of higher tax revenue and corresponding local expenditure.

First addressing the stimulative impact we note that most of the OCS workers are in enclaves which are assumed isolated commercially from the local Yakutat economy and thus most OCS workers have little stimulative impact. In addition, we note that if 10 percent of the Yakutat local workers shift jobs to high paying, year-round OCS employment, that this will be mildly stimulative. Also, we note that if contrary to our assumption, this 10 percent is replaced in the local non-OCS economy by immigrants, this will be moderately stimulative and raise the 1980-90 local non-enclave employment growth rate from 3.8% per year to 4.8% per year. Thus, we might estimate the stimulative employment impact at mild to moderate.

Second, addressing the disruptive impact of the 10 percent reduction in Yakutat non-OCS employment over the base case we note the following. The impact of local petroleum industry hiring amounts to reducing the local non-OCS employment growth during the 1980's to 2.8% from 3.8%. This is a mild impact to the extent that non-critical local personnel such as maintenance people are not hired due to a presumed guided policy. If, contrary to our assumption, local OCS employees are replaced by immigrants, this impact is further lessened. Thus, the impact of hiring away local employees is assumed mild to moderate because of the controls implied by our guided development assumption on the part of petroleum companies.

The third area of concern is the stimulative impact of local petroleum industry purchases including land. Obviously, a giant oil and gas deveopment project next to a small town such as Yakutat could loose a purchasing boom if not contained by agreement. We have assumed local purchasing will be limited by oil company-Yakutat agreement nondisruptive. An additional moderating factor is that the companies usually purchase most items direct from Anchorage and the lower 48. Moreover, much land is owned by local government type organizations and the implied land boom profits will probably just add in part to already large expected government type revenues where they can be neutralized. Thus, we believe the stimulative effect of purchases will be mild to moderate.

Finally, as explained in the next section, large revenues will occur to local government due to increases in its property tax revenue. In response to this, the local government will probably increase capital expenditures which are quite stimulative. However, we assumed from the scoping process that local government will wish to limit disruptive boom condition impacts from its spending and thus the size and stimulative impact from its spending will be mild to moderate.

In summary, it appears that with full enclave conditions, and intentional non-disruptive policies, agreed to and pursued by both the oil industry and the local government, the impacts of a large petroleum development at Yakutat can be contained to a mild to moderate level.

Partial Enclave Case: As explained earlier, a range of increasing economic impacts on Yakutat is possible if the most likely forecast of migrant petroleum employment gives way to lesser use of enclaves. To capture the extent of this range of impacts we have presented below the economic impacts of a situation where operations employment are not contained in enclaves and only the majority of development employment is contained in enclaves. This situation has been modeled for us by ISER on its Map Model and connected local population model. The results of these model runs in terms of economic impacts on Yakutat employment are shown in the two tables below.

ISER Estimate of Direct Census Division Employment in Mean Scenario
(Average Year Employment)

Years	Total Census Division Direct Employment	Operations Sector Local Employment	Operations Sector in Migrant Employment	Development Sector Local Employment	Development Sector in Migrant Employment
			Five Year Average		
1981-85	123	13	50	12	48
1986-90	405	24	95	27	259
1991-95	169	29	140	--	--
1996-2000	163	33	130	--	--

Table notes: 1) ISER estimate of direct census division Employment differs somewhat from BLM estimates in the full enclave case because of different allocation factors.

2) Local employment is estimated based on modeled local labor market response factors.

3) Source of these estimates are ISER, Northern Gulf of Alaska Population and Economic Impact Analysis, Pg. 23, Appendix Table B-8 and Appendix C.

ISER Estimate of Total Employment
Impact of Mean Scenario Under Partial
Enclave Conditions

Years	(1) Base Case Yakutat Employment	(2) Yakutat Resident Local Petroleum Employment	(3) Yakutat In Migrant Non-Enclave Petroleum Employment	(4) Secondary Employment Impact	(5) Yakutat In Migrant Enclave Petroleum Employment	(6) Yakutat Non-Enclave Local Employment (1)±(2)±(3)±(4)
	LAST YEAR	FIVE YEAR AVERAGE				
1980	301					301
1980-85	365	25	50	49	48	489
1986-90	439	51	95	115	259	700
1991-95	501	29	140	90	---	760
1995-2000	519	33	130	88	---	770

Table Notes:

1) Base case Yakutat employment from Alaska Consultants and cited in no sale case.

2) Resident local employment from table above.

3) Columns (3), (4), and (5) taken from ISER, Northern Gulf of Alaska Statewide and regional population and Economic Systems Impact P-40. These estimates assume all in migrant development employment locates in enclaves.

4) The impact of local secondary employment is assumed in the summing process in column (6) to be in-migrant. Actually, much secondary employment will be resident non-in-migrant and column (6) is slightly over estimated due to double in column (4) of some base case employment in column (1).

In examining the impact on Yakutat of the partial enclave scenario case, it is important to note that based on our scoping process, we regard it as unlikely because of the desires and control capabilities of the people in Yakutat. Nonetheless, this case has been included in order to give a range to the economic impact possibilities above the virtual local commercial isolation of petroleum development in the most likely full enclave case.

In our analysis of the partial enclave case, we can consider the same four areas covered in the full enclave case, namely 1) economic stimulus from added employment,2) economic dislocation from local resident hiring, 3) economic stimulus from industry local purchases, and 4) economic stimulus from local expenditure of increased tax revenue.

Addressing first, the stimulus of added employment, we can see in the table above the stimulus is large. Base case local employmment increases from 301 in 1980 to 439 in 1990 or by 3.8 percent per year but local non-enclave employment increases in the (column 6) development case from 301 in 1980 to 700 in 1990 or by 8.8 percent per year. These are boom conditions which will generate economic dislocation, labor shortage, rapid migration, and land price inflation.

It is estimated that this employment stimulus will generate moderate to severe boom conditions limited by the small size of the town and its relatively easy import ability up to and including modular homes and stores.

In the case of the second factor, dislocations from direct hiring of local (column 2) people and consequent secondary employment (column 3), this is shown in the table to be mild to moderate. The disruption is contained by the limited usefulness of the Yakutat labor skill pool for petroleum development by the presumed non-disruptive hiring policies of the petroleum sector. It is also contained by the use of new immigrants in the primary and secondary sectors. The impact might be larger without an agreed on hiring policy between industry and Yakutat because of the sector's tendency to hire skilled mechanics, etc. Similarly, the secondary hiring shown could tighten labor increases considerably if little immigration occurs.

Finally, with regard to the last two impact areas, increased local industry purchases and increasesd local government expenditures, these should be mild to moderate impacts in part because of the industry tendency to import direct and in part because of the assumed non-disruptive spending policies by both industry and local government.

In summary, the moderate to severe impacts of the first factor plus the mild to moderate impacts of the last three factors should generate outright boom conditions in Yakutat and the virtual economic transformation of the town during the 1980's. For good or bad, the economic impact is likely to be severe if this word is used as a neutral measure of degree of change. Things would moderate a good deal during the 1990's but the town would now be petroleum and fishing basing instead of a small fishing town.

Local Government Financial Impacts: An area of major impact alluded to earlier is the increase in Yakutat's tax base and the new revenues likely to be available for capital improvements. Shown below are the representative case local governmental revenues estimated to be available for capital improvements in the no-sale case, and the additional petroleum based revenues which would be available at maximum tax rates of up to the limit of $1,500 per capita. As shown, the annual revenue increase available for additional capital improvements is very large. For further discussion or local tax options, see Alaska Consultants, Inc., Northern Gulf Impacts, as cited in the non-sale case.

Local Revenue Impact of Petroleum Facilities
(mean case)

Year	(1) No Sale Revenues Available for Capital Improvements	(2) Addition to Tax Base from Petroleum Facilities	(3) Maximum Tax Revenues at $1,500 per Capita	(4) Addition Property Tax from Petroleum if Unlimited
		MILLION DOLLARS		
1980	.067			
1985	.096	(partially built)	(partial)	(partial)
1990	.142	130	1.6	3.9
1995	.215	130	1.6	3.9
2000	.301	130	1.7	3.9

(1) Assumes 6 percent inflation rate and recent mil rate (Alaska Consultants, opcit)

(2) Includes $125 million terminal and $5 million service base expansion. Assumes depreciation and inflation cancel. An LNG plant would increase this amount many times.

(3,4) Assumes maximum 30 mil rate or $1,500 per capita limit (see Alaska Consultants for more information). No sale case area population plus enclave employment in the full enclave case are used as the population base for the $1,500 per capita calculation. It would be larger in the partial enclave case.

Conclusion: Economic impacts of the proposal interims of rapidly increased employment, income, prices, and dislocations, range from mild to moderate in the more likely full enclave case with non-disruptive policies by both industry and government. As the possibilities range toward the less likely case of partial enclave development, the impacts range from moderate to severe and dislocations become considerable. The main impact element is the large size of the petroleum development compared to the very small size of the fishing village. In both cases, however, local government benefits by large increases in tax revenues.

Cumulative Effects: Cumulative economic effects on Yakutat could have come from sale 39, lower Cook Inlet, and future sales of 60 in lower Cook Inlet and 46 on Kodiak. Of these OCS sales, only sale 39 is close enough geographically to have had any impact either specifically or cumulatively on Yakutat. Although there may have been some short-term economic effects of the exploratory phase of sale 39 on Yakutat, the lack of an oil discovery and any potential development or even continued exploration in sale 39, does not suggest much of any potential for a cumulative economic effect from sale 39 on Yakutat. Thus, there are no cumulative economic effects of past OCS lease sales in the Gulf of Alaska and Cook Inlet on Yakutat. Yakutat is not sufficiently geographically close enough to either Cook Inlet or Kodiak to be cumulatively economically impacted by OCS activities in those areas.

Unavoidable Adverse Effects: There are probably only mild to moderate unavoidable adverse effects to this proposal because severe impacts can be avoided by a requirement on the part of Yakutat governments that petroleum development be fully enclaved and that industry hiring and purchasing be non-disruptive.

Thus our most likely assumption is that Yakutat willreach agreement with the petroleum companies to guide petroleum development impacts in Yakutat to non-disruptive magnitudes and thus development will not transform the current small, largely Native fishing village.

While it seems to us that several examples of a similar type of controlled development already exists in Cook Inlet and North Slope Alaska and that this assumption is therefore reasonable.

Under these full enclave conditions, the future employment in Yakutat under the mean petroleum development scenario is shown below. Total Yakutat local employment rises, as in the no-sale case, from 301 in 1980 to 594 in 2000, but in this development case, 10 percent of these employees move from other employment to the petroleum sector. Local petroleum employment, therefore, rises from 0 in 1980 to 52 in 2000. Similarly, employment in the local non-petroleum sector rises from 301 in 1980 to 467 in 2000. As shown, enclave and offshore employment grows from 1981 and remains at more than 200 during most of the period, except when rising to a temporary peak of 896 (not shown) in the 1987 construction period. Thus, total employment in the Yakutat area rises from 302 in 1980 to 735 in 2000 with a temporary peak in the mid-1980s.

Yakutat Employment Forecast with the Proposal
(mean case development)

	Yakutat non-OCS Local Employment	Yakutat Local OCS Employment	Enclave and Offshore Employment	Total Employment
1980	301			302
1985	311	37	211	559
1990	395	44	317	756
1995	451	50	218	719
2000	467	52	216	735

Source: BLM/Alaska OCS Estimates, 1979.

The local economic impacts of this full enclave type development are probably mild. First, note that the extent that a limited number of local Yakutat residents merely shift jobs from fishing (for instance) to more regular or easier petroleum employment. Little impact occurs other than fewer fishing boats, fish, or timber. Little impact is likely

because much of the fishing and fish processing for the Yakutat area is, for example, done by fishermen or processing plants from other areas, and it is difficult to foresee any second round impact. Probably the industry would just grow a little more slowly.

Another area of concern is wage competition for labor between the processing industries and the petroleum industry. The need for students, casual labor, and women used in processing is not great in petroleum, and thus, processing wages are not likely to be driven up to non-economic levels.

Local Commercial Fishing Industry: Analysis of impacts of this proposal on fish populations elsewhere in the statement demonstrated that except for pink salmon, population reductions would be small and unquantifiable. Therefore, there should be little effect felt by the commercial fishermen using the resources of the proposed lease area.

There would, however, be several adverse impacts attributed to the proposed lease sale should production occur. These impacts would be similar in all fisheries although of differing magnitude. These impacts are loss of fishing gear, loss of fishing area, competition for labor and materials, inability to market fish because of flavor tainting, and loss of fishing time because of proposed activities.

Fishing gear has been and may be lost during the exploratory and production phases of offshore oil and gas development. Seismic, support, and supply boats, if unregulated, have and probably would run through fishing grounds to the detriment of fishing gear. Crab pot fishermen suffer the most. Running gear can destroy the floats or move pots into water so deep the floats cannot be seen. In a town like Yakutat, replacement pots (costing $500.00 or more) may not be available after the season starts. Shipment of pots from Seattle can take several months at which time the crab quota may be taken or the season ended and the fishing over. The Fishermen's Compensation Fund does compensate for lost catch.

This impact would probably not affect all the fishermen at the same time, but more than one could be affected in any year. This impact could be mitigated (see sec. I.B.1.b.). The severity of impact would depend upon when this happens during the season, how many pots are lost, and how soon replacements are made. We cannot quantify the severity of impact in dollars, but it could conceivably cause the loss of 1 season's profits to at least 1 fisherman per year.

Salmon or herring gill nets that may be fouled during a pollutant event is another type of gear that could be lost because of the proposal. The chance of loss is less because of the smaller chance of spills, the shorter timeframe that they are in the water, the presence of the owners while they are fishing, and the areas (some in streams and inside barrier beaches) fished. Impacts would not be as severe as with lost pots.

Approximately 8-10 acres of ocean bottom would be required for the 2-3 production platforms needed to produce the estimated oil and gas reserves within this proposal. This is a very small amount when the eastern gulf area or the sale area (792,000 hectares or almost 2 million acres) is considered.

Ground fish and halibut fishermen would probably be the most affected by this loss of fishing habitat, but in this case, the effects would be minimal. Site restriction for protection of biological and therefore commercial species are already in force to further reduce impacts from this effect.

There will be some competition for labor force and materials. Oil and related companies generally offer higher wages than fish processors and municipalities. They have also exhibited a willingness to pay a higher price to get materials exactly when and where they need them. This also is a luxury small businesses and small towns do not have.

It is conceivable that there could be some short-term shortages of supplies and the lesser skilled working force because people and transport are totally committed to the oil companies' activities. This is a possibility, but considering the experience gained through OCS sale 39 which used Yakutat as a support and supply base, it is a relatively minor one. About 10 percent of the Yakutat population would undoubtedly be affected, but to what degree is an open question.

The impact of the unmarketability of flavor tainted fish is another open question. It does happen, but must not be a notable happening because there is seldom a report on it. In all the years of oil activity in Cook Inlet, there has only been 1 report of 1 fisherman not being able to sell 1 load of crab because of flavor tainting. The source of the tainting material is unknown.

Crab and salmon would be the most susceptible to flavor tainting should an oilspill occur during the fishing season for these species covering an area where they are fished. Crab pots could be left on the ocean floor until the pollutants drifted away, and could then be pulled through clear water. Some additional expense for either cleaning old buoys and line, or buying new ones, would be required and would be part of the impact.

Salmon gear (gill nets) would probably need to be replaced and whatever salmon were in them would be lost to the market. The chance of impact is slight but probable.

The loss of fishing time because of the proposal activities covers a wide range of possibilities. These include but are not limited to: time lost because of oil in the water over fishing grounds, gear replacement is slow, boats and gear must be cleaned, and help is not available. These are all possible impacts on the fishing industry. At present, there is a lack of these problems for the Alaskan fishing community.

Conclusions: There could be some adverse impacts on the commercial fisheries using the resources of the proposed eastern Gulf of Alaska lease area. These are unquantifiable, although crab and salmon fishermen would be impacted the most. At least 1 crab fisherman and 1 salmon gill net fisherman will probably lose 1 fishing season over the life of the proposal. This could have further financial implications for the affected fishermen, but the total impact is unknown.

Cumulative Effects: Impacts from a possible oil and gas development area in the northeastern gulf including Cook Inlet/Kodiak and sale 39 and a spill

from a tanker carrying oil and/or refined product from Valdez could conceivably expand the impacts cited above to more than 1 fisherman for more than 1 year. This is possible but not probable. Otherwise, no cumulative impacts are likely as the area is not otherwise affected by previous sales.

The cumultive or interactive impacts of local developments have been considered in the alternative and its conclusion above. In addition to these local cumulative or interactive impacts, there are interactions with major non-local developments to be considered. In general, however, interactions with major non-local development do not seem likely. For example, sale 39 offers no development potential and OCS sales 46, 60, and CI are too far away. Tankering of Beaufort Sea, Prudhoe Bay, Pacific LNG, and Alpetco resources seem unlikely to interact with the Yakutat economy except possibly in the commercial fishing area. Thus, no cumulative economic effects outside of those discussed in the locale of this alternative are foreseen.

Unavoidable Adverse Effects: Some fishermen will be inconvenienced to the point of losing several days' fishing time because of this proposed action. Some gear and some fishing area will be lost because of this proposal. The overall amount will be small, but to the individual fisherman, this could affect his livelihood for a year.

* Impacts on Cultural Resources: The following discussions regarding potential impacts to cultural resources assume that the proposed committed mitigating measure (sec. I.B.1.b., Protection of Cultural Resources) will be in effect.

Terrestrial Archaeologic and Historic Sites: Direct adverse impacts to terrestrial sites could occur as a result of various construction activities (support/supply bases, production facilities, gravel borrow sites, etc.) normally performed on coastal areas adjacent to the lease blocks. Based on existing data, the Monti Bay area has a relatively high concentration of historic and prehistoric sites and could, therefore, be subject to significant adverse effects. There is also a National Register property (New Russia site) which could be adversely affected. Any such impacts to this site would most likely result from the routing of oil and gas pipelines adjacent to the site. Activities such as these could severely damage or totally destroy cultural materials, as well as the context in which they exist. Such a loss could be considered irreplaceable with a potential significant loss of scientific information.

Impacts to archaeologic and historic sites located on the coastal areas could be directly affected by oilspills. The direct oil contamination of cultural materials could render them unrecognizable, or significantly reduce the amount of scientific information obtainable. Although empirical data are lacking, it is believed that the direct oiling of datable artifacts could adversely affect the radiometric dating potential of such materials.

The oilspill risk analysis (sec. III.A.1.d.) indicates that in the event of an oilspill, the coastal area from Phipps Peninsula to Dry Bay would have the highest probability (58 percent) of being oiled. This portion of the coast also coincides with the highest concentration of known sites. Although most of these sites are above normal wave action, it is possible that some sites could be damaged or destroyed by direct oiling. The presence of oil adjacent

* Issue of Significant Concern

to a site would also cause detrimental effects, although this would not be as severe. The probability of spilled oil impacting other portions of the coast is relatively low (8 percent or less), and there is a zero percent chance of either a direct or indirect impact on a National Registered property resulting from spilled oil.

Additional indirect impacts to cultural resources could occur as a result of salvage archaeology. When salvage archaeology must be conducted because no other site option exists, some values which might accrue to a future investigator due to greater knowledge and more sophisticated analytical techniques and equipment, are permanently lost. There is also a potential impact to repositories due to the collection of cultural materials. Due to the limited number of qualified repositories, particularly for archaeologic materials in the State of Alaska, as well as the low number of curators, the collection of site materials could have a very significant effect on the accessioning by the typically limited budgets of Alaskan repositories.

A positive effect of the proposed action on cultural resources could occur as a result of required historic and archaeologic surveys. The investigation and systematic collection of specimens could increase the knowledge of historic and prehistoric cultures of the region.

Known and Potential Archaeologic and Historic Sites: Of the 5 identified shipwrecks adjacent to the proposed lease area, the vessel Kayak is the only site which could be impacted as a result of oil and gas activities. This vessel could be damaged or destroyed by dredging activities which could be required to maintain a safe vessel corridor into Monti Bay. The vessel could also be covered by sediment resulting from dredging operations adjacent to the site. Although the historic value of this shipwreck has not been evaluated, it is assumed that any damage to or destruction of this site would constitute a significant adverse effect.

Based on the evaluation of offshore site probabilities (sec. II.C.3), remote sensing surveys will be required on those nearshore blocks which indicate a high probability of site occurrence. Such a survey will significantly decrease the possibility of damage or destruction to cultural materials.

Sites which are not detected by required surveys, or sites which may occur in blocks not requiring surveys, could be adversely affected by the placement of offshore platforms, pipelines, and related facilities. Further impacts could occur due to increased sedimentation resulting from such activities. Such sedimentation could substantially increase cover over cultural materials, and thus, significantly reduce detection by remote sensing equipment. Such activities could destroy, damage, or severely limit detection of site specimens, thus reducing the amount of obtainable scientific information. Such site materials are likely to be of considerable antiquity and scientific value.

The increased activity resulting from the proposed action could indirectly affect cultural sites adjacent to construction sites. Such impacts could result from the mooring of support and supply vessels, as well as the lightering of materials to shore by barge.

A positive effect of such activities could result from the detection and possible retrieval of archaeologic specimens during the construction and

placement of offshore facilities. Such artifacts could significantly increase the knowledge of prehistoric sites.

Direct impacts to cultural sites could result from off-lease construction activities, and oil contamination of site materials. Indirect impacts could result from the siting of oil and gas facilities adjacent to cultural sites, oiling of the cultural environment, and through the processes of salvage archaeology. Significant adverse effects on potential submerged archaeologic sites could affect some unidentified or undetected sites. Although unlikely, potential sites could be affected by the siting of offshore facilities, an increase in siltation from construction activities, as well as an increase in marine traffic. A beneficial effect of the proposed action could result from site surveys and the systematic collection of cultural specimens.

Conclusions: Development resulting from the proposed lease sale could cause both significant direct and indirect adverse effects on terrestrial archaeologic and historic sites.

Cumulative Effects: The additional transportation of oil which could result from this proposal, combined with the present tankering from Valdez, could further jeopardize archaeologic and historic remains located on the coastal areas. Although unlikely, the discovery and verification of substantial oil/gas resources as a result of this proposal could lead to additional development in the future, which could potentially increase the impacts to onshore and offshore archaeologic and historic remains important to the understanding of past cultures. However, it is highly unlikely that sale 39, which discovered no oil at least commercially and has no development potential, wouldhave any cumulative effect on the proposed sale 55 area or the coast in its vicinity. The other potential OCS sale areas in lower Cook Inlet and on the Kodiak shelf are quite simply entirely too far away to have any cumulative affect on cultural resources in the proposed sale 55 area from either a disturbance standpoint or an oilspill.

Unavoidable Adverse Effects: Unavoidable damage will occur when historic sites are not preserved or are not identified in time to take action for their preservation. Structures located adjacent to sites would adversely affect the cultural environment.

Onshore archaeological sites or artifacts may not be detected with total certainty by surveys. Those which remain undiscovered would be damaged or destroyed, partially or wholly, if construction occurs. When an archaeological site must be excavated because no other site option exists, some values which might accrue to a future investigator due to greater knowledge and more sophisticated analytical techniques and equipment, are permanently lost. Concealment of artifacts discovered by contractors could also result in their destruction. The duration of these impacts would be permanent. The incidence of damage on the continental shelf is likely to be low, but is potentially higher in the coastal zone. However, as site materials found on the outer continental shelf would probably be of considerable antiquity, the scientific value of the loss of such materials could have a significant effect.

Other damage to archaeological resources could come from oil contamination. Historical and archaeological materials soiled by an accidental oilspill may not survive subsequent cleaning and restoration efforts. Further, the direct

oiling of datable artifacts could adversely affect the radiometric dating potential of such materials. The probability of such a pollution event occurring and interacting with artifacts is low and the potential for significant resource destruction appears small, although it does exist.

Impacts on Visual Resources: The location of offshore platforms, pipeline alignments, and onshore support, supply, and production facilities must be considered when assessing potential visual impacts to the environment. The degree to which portions of the proposed oil and gas facilities are evaluated involves the setting, individual expectations, seasonal variation, visibility, and distance. The manner in which potential development is evaluated would vary by the individual, particularly in terms of the place from which the development would be seen. Therefore, an oil and gas facility seen from a prime conservation area can be considered visually obtrusive, whereas that same facility seen from an existing industrial area may not as effectively impact the observer.

Figure III.A.2.b.-1 indicates areas where viewsheds would be impacted under various scenarios by the erection of offshore production platforms and their attendant onshore pipelines, as well as oil and LNG facilities. In fig. III.A.2.b.-1, 10 miles is the perceived normal limit to viewer perception of offshore facilities. Exceptions to this visual limit may occur in conditions of unusual atmospheric clarity and on clear, still nights when the illumination of drill rig lights will carry great distances.

The aforementioned figure also indicates viewsheds in which oil and gas facilities would have a significant adverse effect on the visual environment. The degree to which such facilities impact the visual environment is dependent on prevailing conditions such as season, climate, distance, and light, as well as the physical characteristics of the facility, i.e., size, color, and form. Referring to table II.C.5.-1, it does well to note that the area during much of the year is prone to low light situations from either seasonal light variations or from climatic instability.

Under the proposed action, the Yakutat Forelands and the environs of Yakutat would receive adverse visual impacts. The Yakutat Forelands would be the area in which the visual impact of offshore exploration/production facilities would be the greatest. Beyond the forelands, to the north and south, the grass-sedge regime grades into the Sitka-Spruce-Western Hemlock System. Human perception becomes more limited as the vegetative growth becomes higher and denser.

According to the requirements of the proposed action, the area of the Yakutat township would be the site of up to 146 hectares (365 acres) of industrial development, which would include an oil terminal and possibly an LNG terminal. These facilities and their attendant ancillary structures would constitute a significant alteration and degradation of the existing visual environment. Attempts to mitigate the visual impact of the proposed facilities such as pipeline burial and landscaping would be of some benefit.

According to the oilspill risk analysis (sec. III.A.1.d.), that area which would receive the most visual (as well as wilderness and recreational) impact from an oilspill would be the area encompassed by the Glacier Bay National Monument.

The visual impact which could occur from a major spill is a scene familiar to the general public. It could obviously detract from the scenic quality of the area; however, the affects will be short-term in nature.

Conclusions: The scenario called for in the proposed action would result in a significant adverse effect of the visual environment. The least of the visual impacts would occur within the area of the Yakutat Forelands. Adverse climate, distance, and changes in vegetation would largely eliminate the negative visual impacts of the offshore platforms. The most prominent case of visual pollution would occur in and around the township of Yakutat. The use of natural vegetation to screen the facilities and the burial of onshore pipelines would mitigate some adverse effects.

Cumulative Effects: The cumulative effect of an LNG plant and tanker terminal in Monti Bay on visual resources in the Yakutat coastal area could be substantial over the life of the proposed project. There are no cumulative visual effects due to prior lease sales, sale 46, 60, CI, and 39. The rationale for no cumulative visual impacts on Yakutat from either non-development of sale 39 or potential OCS activities in lower Cook Inlet and Kodiak is that these areas are well over 500 miles away from Yakutat and quite beyond the normal 15 or so miles out to sea that could be seen from the Yakutat shoreline. Sale 39 has no development potential because no oil was discovered and thus is unlikely to contribute to any onshore facilities development in Yakutat that could have conceivably resulted in a very localized cumulative visual impact. The actual lease are for sale 39 was quite far northwest and out of visual range from Yakutat.

Unavoidable Adverse Effects: The unavoidable adverse effect of the proposal on the visual resources of the the Yakutat coastal area would be severe because of the long-term degradation of the visual quality of undeveloped coastal areas.

In the event of an oilspill, there would be a short-term but highly negative impact on the visual quality of the Glacier Bay National Monument.

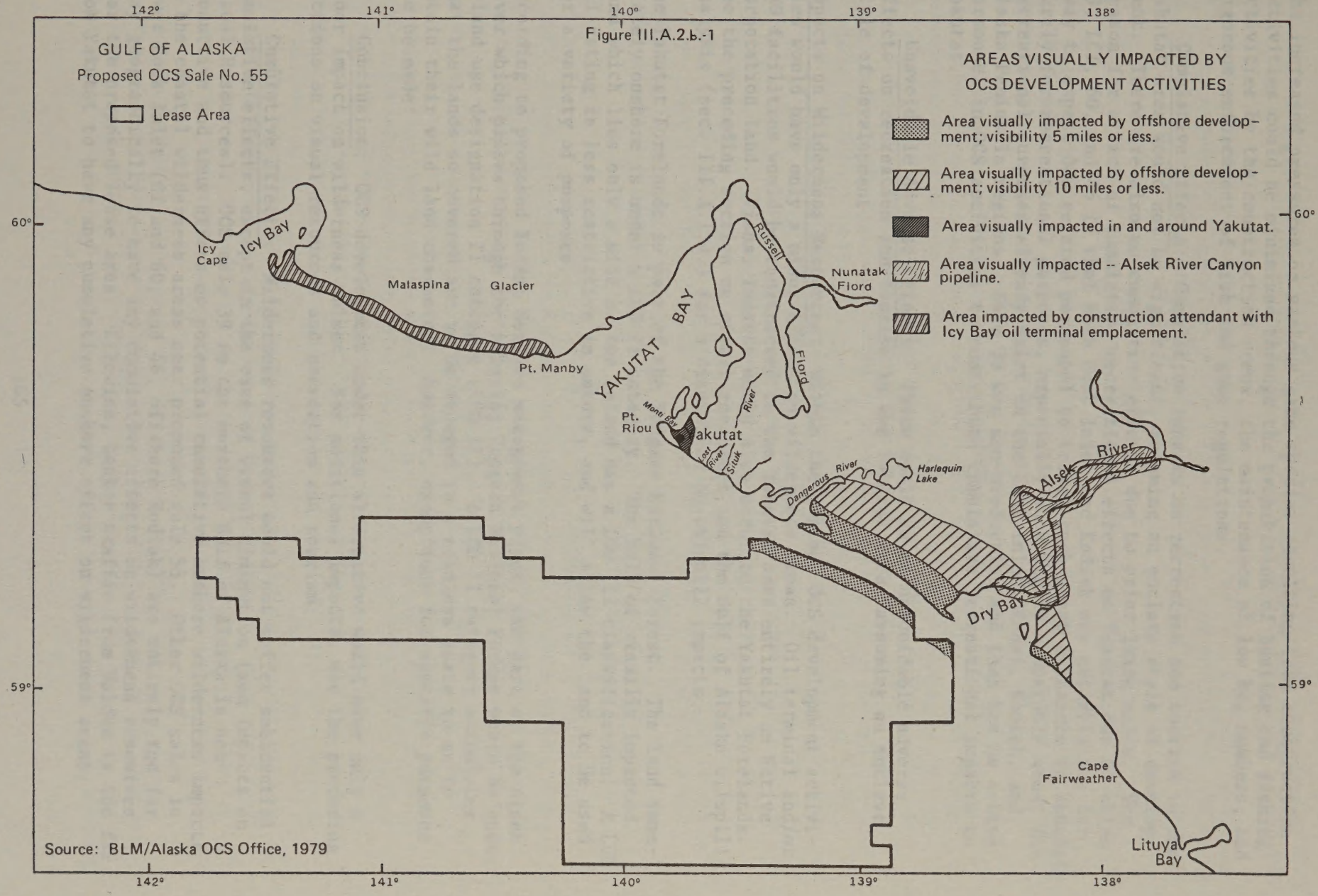
Impacts on Recreation and Tourism: Within the environs of the township, significant short-term impacts would accrue from OCS development and production programs.

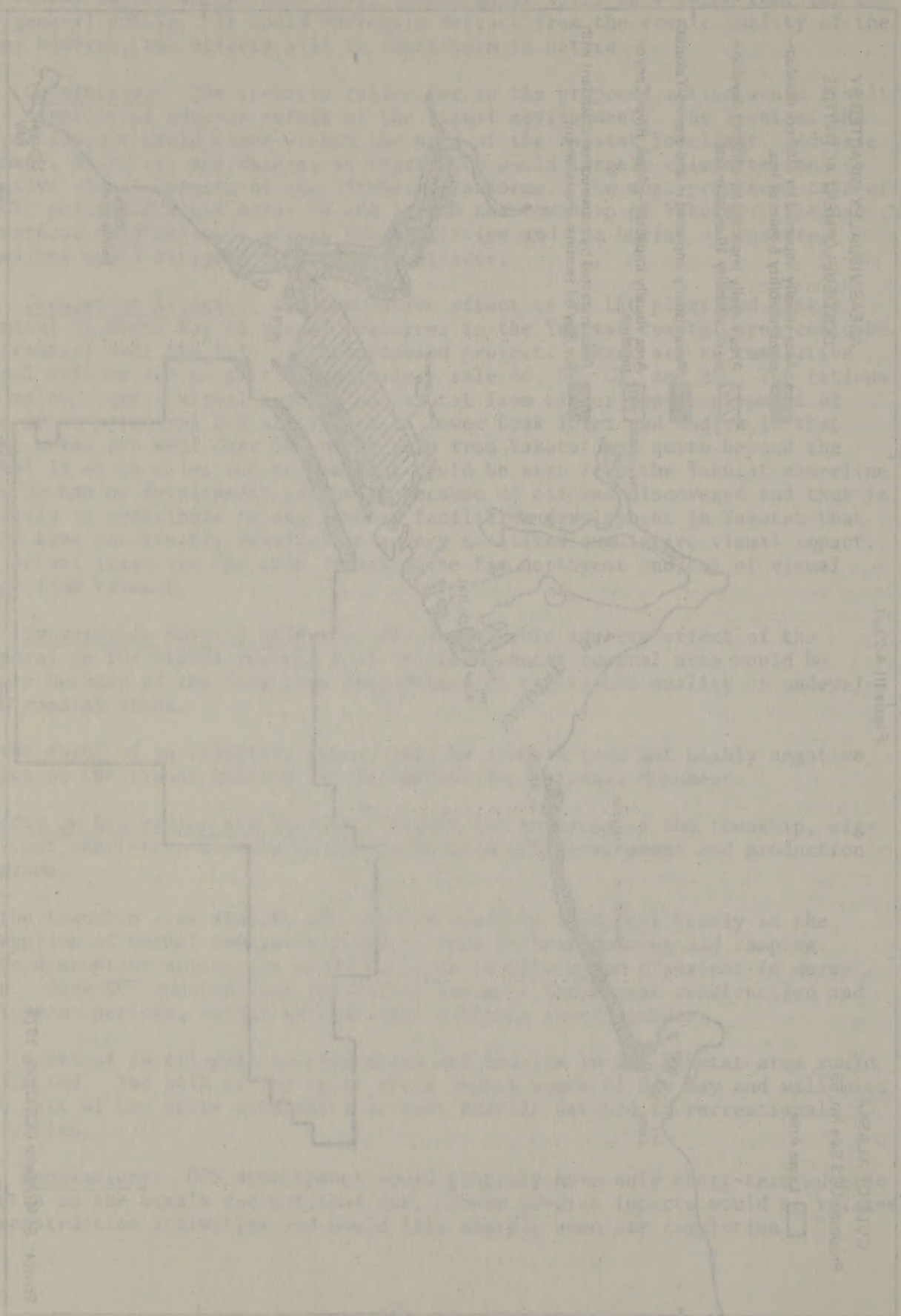
In the township area itself, OCS impacts would be felt most keenly in the disruption of normal tourist activities such as beachcombing and camping. These disruptive activities would be local in nature and transient in duration. Once OCS construction activities are past their peak construction and employment periods, normal recreational patterns should return.

The impact of an oilspill on recreation and tourism in the Yakutat area would be limited. The bulk of the spill would impact south of Dry Bay and will miss that part of the shore area which is most heavily devoted to recreational activities.

Conclusions: OCS development would probably have only short-term adverse impacts on the area's recreational use. These adverse impacts would be related to construction activities and would fall sharply upon its completion.

Figure III.A.2.b.-1





The increased pressures on various game species resulting from construction activities could be minimized through the prohibition of hunting and fishing activities by the construction crews, the maintenance of low bag numbers, and vigorous enforcement of fish and game regulations.

Cumulative Effects: Cumulative impacts on recreation and tourism in the Yakutat area would not be significant, assuming an enclave style of development. There are also no cumulative effects due to prior lease sales. The reason for a lack of cumulative recreational effects on Yakutat due to sales 39, LCI, 60, and 46 is that both Cook Inlet and Kodiak are entirely too far away to expect OCS related personnel to travel such great distances to Yakutat purely for recreational purposes, especially when highly comparable areas for recreational purposes already exist in the Cook Inlet, Kenai, Kodiak, and Alaska Peninsula regions. Sale 39 was non-productive and thus has no active personnel in OCS activities to contribute cumulative recreational impacts to Yakutat.

Unavoidable Adverse Effects: There would be no unavoidable adverse effects on recreation and tourism in the Yakutat area, assuming an enclave style of development.

Impacts on Wilderness Resources: Within the region, OCS development activities would have only a minor effect on wilderness areas. Oil terminal and/or LNG facilities would be constructed in the Yakutat area entirely on Native corporation land. Visual impacts would also occur on the Yakutat Forelands. See the preceding section on visual resources and the Gulf of Alaska oilspill analysis (sec. III.A.1.d.) for a discussion on oilspill impacts.

The Yakutat Forelands is part of the Tongass National Forest. The land immediately onshore is under a LUD II category. The bulk of visually impacted land which lies only a mile or two inland has a LUD III classification. A LUD III rating is less restrictive in nature, and will allow the land to be used for a variety of purposes.

According to proposed Forest Service management plans, the part of the Alsek River which passes through the existing Tongass National Forest would be under a land use designation II category (LUD II). A LUD II category stipulates that the lands so covered are to be managed in a roadless state so as to retain their wild land character. However, exemptions for specific purposes can be made.

Conclusion: OCS development under this alternative would have only a minor impact on wilderness values. For additional impacts, see the preceding sections on visual resources and recreation and tourism.

Cumulative Effects: Wilderness resources would not suffer substantial cumulative effects, except in the case of visual diminution (see Impacts on Visual Resources). OCS sale 39 in the northern Gulf of Alaska is non-productive and thus offers no potential cumulative onshore wilderness impacts to the coastal wilderness areas near proposed sale 55. Other OCS sales in lower Cook Inlet (CI and 60, and 46, offshore Kodiak) are entirely too far away geographically to have any cumulative effects on wilderness resources near the proposed lease area. Likewise, tanker traffic from Valdez is too far from Yakutat to have any cumulative onshore effect on wilderness areas.

Unavoidable Adverse Effects: There would be no unavoidable adverse effects on wilderness resources in the Yakutat area.

Impacts on Land Use: Several important land areas adjacent to the proposed lease area still have no permanent land classification. This relates to actions by Federal and state governments, and Congress as discussed in sec. II.C.7.

The proposed action assumes the following (see table III.A.2.b.-5):

A crude oil terminal at Yakutat, requiring between 22 and 56 hectares (54 and 138 acres). This does not include land needed for associated docking facilities, but does include the necessary area for enclave development.

A service and supply base at Yakutat, with machine and welding shops, supply stores, pipe storage yards, office and warehouse space, and transportation (marine and air) facilities, as well as a variety of support services such as repair and maintenance facilities, catering services, and water. The present service and supply facilities in Yakutat total approximately 6 hectares (15 acres). With an oil terminal sited at Yakutat, an additional 10 hectares (25 acres) would be needed to expand service and supply base capabilities (table III.A.2.b.-5).

Fifty miles of offshore pipeline and 10 miles of onshore pipeline (table III.A.2.b.-5), none of which is presently in place. Offshore, it is assumed that a right-of-way of 50 ft will be used for an oil pipeline, resulting in a right-of-way withdrawal of close to 2.43 hectares (6 acres) per mile of pipe. Onshore, it is assumed that an oil pipeline would require 2.84 hectares (7 acres) per mile of pipe, or a right-of-way of approximately 58 ft. The extra right-of-way would be required for a road parallel to the pipeline for construction equipment.

Fifty miles of offshore gas pipeline and 10 miles of onshore pipeline with an LNG plant at Yakutat (for the maximum or commercial case), none of which is presently in place (table III.A.2.b.-5). Acreage for gas pipeline right-of-way is similar to those described for the oil pipeline.

In addition to direct demands for land resulting from offshore production in the eastern gulf, certain secondary land use demands would occur. As induced populations move into existing or new communities, they would create a demand for residential, commercial, public and quasi-public, and open space lands. Land use demands may encroach on existing land configuration and, in some cases, may require extensive changes in land use patterns. Since Yakutat is targeted for most of the direct terminal and support facilities, even a small demand for new dwellings and secondary services would have a significant impact on land use patterns there. Table III.A.2.b.-6 lists present land use acreages in Yakutat, and table III.A.2.b.-7 presents possible land use acreage changes as a result of the proposal and alternatives.

Conclusions: The proposed lease sale is not expected to have a direct impact on land status; instead, the major impacts would result from changes in land use. Land use changes would be especially critical at the local level, specifically in Yakutat, where there may be a tendency to realize short-term

Table III.A.2.b.-5[1/]
Land Use Requirements for the Proposal and Alternatives

Facility	Proposal	Alternative IV	Alternative V
Onshore Crude Oil Terminal	One, at Yakutat 22-56ha (54-138a)	One, at Yakutat 22-56ha	One, at Yakutat 22-56ha
Support and Supply Bases	Yakutat 10ha (25a) [2/]	Yakutat 10ha (25a) [2/]	Yakutat 10ha (25a) [2/]
Oil Pipeline R/W			
Offshore	50 miles 2.43ha (6a)/mi 122ha (300a)	50 miles 2.43ha (6a)/mi 122ha (300a)	50 miles 2.43ha (6a)/mi 122ha (60a)
Onshore	10 miles 2.84ha (7a)/mi 28ha (70a)	10 miles 2.84ha (7a)/mi 28ha (70a)	10 miles 2.84ha 28ha
Gas Pipeline R/W			
Offshore	50 miles 2.43ha (6a)/mi 122ha (240a)	50 miles 2.43ha (6a)/mi 122ha (240a)	50 miles 2.43ha (6a)/mi 122ha (300a)
Onshore	150 miles [3/] 2.84ha (7a)/mi 426ha (1050a) [5/]	150 miles 2.84ha (7a)/mi 426ha (1050a) [5/]	150 miles 2.84ha (7a)/mi 426ha (1050a)
LNG Plant	One, at Yakutat [4/] 81ha (200a) [6/]	same	same

1/ See also tables I.B.1.a.-1 under the proposal, I.B.4.a.-1 (Alternative IV), I.B.5.a.-1 (Alternative V), and I.B.6.a.-1 (Alternative VI). In addition, refer to Appendix A.

2/ About 6 ha (15 a) are already available in Yakutat.

3/ This is assuming the minimum or the mean case discoveries, and no LNG plant. If the maximum case discovery were found, this figure would be 10 mi, for a total of 28ha (70a).

4/ Assumes the maximum case discovery.

5/ This is the amount of acreage leased by the Pacific LNG Company of Los Angeles from Yak-Tat-Kwaan, Inc., in Yakutat, on the south side of Monti Bay.

2.47 acres = 1 hectare; 1 acre = 0.405 hectares

Table III.A.2.b.-6
Existing Land Use
City of Yakutat, Alaska [1/]
1976

Land Use	Land Area	Developed Area	Total Land Area
	Acres [2/]	Percent	Percent
Residential	30.60	15.9	1.6
Commercial	4.30	2.2	0.2
Industrial	47.49	24.6	2.4
Light Industrial	(25.09)	(13.0)	(1.3)
General Industrial	(22.40)	(11.6)	(1.2)
Public and Semi-Public	17.54	9.1	0.9
Public	(13.37)	(6.9)	(0.7)
Semi-Public	(4.17)	(2.2)	(0.2)
Developed Streets	93.00 [3/]	48.2	4.8
Total Developed Area	192.93	100.0	9.9
Vacant Land	1,747.07		90.0
Total Land Area	1,940.00		100.0

[1/] A minor amount of tidelands in Yakutat are also in use. Yakutat's corporate limits include 1,940.00 acres of land, 229.56 acres of tideland, and 2,950.44 acres of water area.

[2/] This represents the amount of land actually in use for the particular category. Multiply by 0.405 to obtain hectares.

[3/] Includes the rights-of-way.

Source: Alaska Consultants, Inc., December 1976. City of Yakutat Comprehensive Development Plan. Anchorage.

Table III.A.2.b.-7 [1]
Potential Land Use as a Result of Sale 55
City of Yakutat, Alaska

Land Use [2]	Proposal Land Area [3]	%	Alternative IV Land Area [3]	%	Alternative V Land Area [3]	%
Residential	35	1.8	35	1.8	31	1.6
Commercial	10	0.5	10	0.5	4	0.2
Industrial	165	8.5	165	8.5	60	3.1
Light	(55)	(2.8)	(55)	(2.8)	(35)	(1.8)
General	(110)	(5.7)	(110)	(5.7)	(25)	(1.3)
Public	16	0.8	16	0.8	13	0.7
Semi-Public	5	0.3	5	0.3	4	0.2
Developed Streets [4]	120	6.2	120	6.2	93	4.8
Total Developed Area	351	18	351	18	205	11
Vacant Land	1589	82	1589	82	1735	89
Total Land Area [5]	1940	100	1940	100	1940	100

[1] See also table III.A.2.b.-3.

[2] Assumes enclave development for the proposal and the alternatives.

[3] Multiply by 0.405 to obtain hectares.

[4] Includes the rights-of-way.

[5] A minor amount of tidelands in Yakutat are also in use. Yakutat's corporate limits include 1940 acres of land, 229.56 acres of tideland, and 2950.44 acres of water.

gains from selling or leasing lands to accommodate petroleum-related facilities.

Induced populations could bring about major changes in land ownership, especially in residential areas. In the long run, the community lifestyle or urban quality may suffer.

There will be direct demands for land in order to explore, develop, produce, and transport oil and gas resources. There will also be secondary demands for space from secondary employment, support facilities, and induced populations.

Because it has the only large-scale infrastructure adjacent to the proposed lease area, Yakutat will receive 95 percent of the impacts from the proposal.

Cumulative Effects: Cumulative impacts associated with the oil terminal would be those secondary or indirect impacts on land use associated with the terminal. There would be impacts if additional land were required for housing construction workers and if land use patterns were altered appreciably because of a need for additional support and supply facilities and pipeline routes.

The present support and supply facilities in Yakutat are probably adequate to handle further exploratory activity. In terms of land use, there would be no direct cumulative impacts from expanding the service and supply capabilities at Yakutat. Additional services associated with the supply base may locate in the commercial district, but the present area in the commercial district should be able to handle expected demand. However, if other industry such as bottomfisheries locate in Yakutat, there may be a competing demand for secondary goods and services, resulting in occasional shortages to permanent residents.

In terms of cumulative land use effects due to other OCS lease sales such as sale 39 in the northern Gulf of Alaska, the lower Cook Inlet OCS area, and sale 46 offshore Kodiak, there are not likely to be any cumulative land use effects due to these OCS sale areas on Yakutat. Sale 39 is non-productive from an oil and gas standpoint with virtually no chance of being developed and thus is not likely to contribute any cumulative land use effects to the Yakutat area.

Similarly, other OCS ares in either Cook Inlet or Kodiak are entirely too far away to cumulatively affect land use in the Yakutat area. Valdez tanker traffic is seagoing only and does not require land use in Yakutat. Threfore, there are no cumulative land use effects due to OCS activities other than sale 55 on Yakutat.

Unavoidable Adverse Effects: There are no existing oil or gas facilities at Yakutat, so terminals would have to be built on undeveloped land. This necessitates that the land be cleared and leveled. The land used for any facility would be adversely affected for the life of the project because of a loss of habitat important to local wildlife populations and changes in natural drainage patterns. The use of the land could also preclude other potential uses of the area, such as recreation and aesthetics.

Impacts on Transportation: In light of recent, final Federal regulations by the Council on Environmental Quality on the composition of environmental impact statements, results of the scoping process for the EIS for proposed sale 55, and after due description and consideration in the environmental

assessment process, it has been determined that the overall degree of impact on the transportation systems is relatively minor, and therefore, both the description and impact discussion have not been included in this EIS for proposed sale 55.

c. Impacts on Coastal Zone Management:

Alaska Coastal Management Program. For consistency review procedures between Federal proposals as well as Federally-sanctioned licenses and permitting activities which will affect the land and water uses of the coastal zone in a state with a Federally-approved coastal management program. See the discussion of CZMA consistency review requirements in Sec. I.B.1.b. and II.D. above.

The determination of consistency between the OCS leasing proposal in sale 55 and the provisions of the approved ACMP are pertinent with the Notice of Sale determination of lease stipulations and post-lease sale activities Any determination of need for consistency or specific consistency determinations between the proposed sale 55 as expressed in the EIS, and the approved ACMP would be premature and is unnecessary.

Yakutat District Coastal Management Program. The proposal is not expected to adversely affect the integrity of the District CMP for Yakutat which is in the progress. If the proposed OCS lease sale 55 occurs in October 1980 as scheduled, then it will have occurred before the Yakutat District CMP is approved by the State. Thus consistency determinations made by DOI, if any, and the Notice of Sale for the proposed sale would have to be evaluated against the approved ACMP rather than the proposed Yakutat District CMP.

The inability of Yakutat to incorporate its coastal management policies into consistency review of the Notice of Sale for proposed OCS Sale 55 should not be considered an adverse impact for the following reasons: (a) the proper scope of Yakutat's CMP will be local in nature; topics of State and Federal interest are restricted by policies of the ACMP and CZMA. Existing policies of the state ACMP should be sufficient for purposes of any consistency review of the Notice of Sale; and b) subsequent DOI leasing decisions ensuing from sale 55, will occur after the Yakutat District CMP is approved by the Alaska Legislature in January or February of 1981. This event would occur before any exploration plan submittals to USGS.

Conclusion: The proposed lease sale will have no adverse impacts on the approved ACMP. Determination of consistency between the proposal and the approved state plan shall be conducted under the Federal CZMA consistency review requirements. The proposal will not have an adverse impact on the proposed Yakutat District CMP and the regional Coastal Resource Service Area Plan. The Yakutat District Plan will likely be incorporated into the ACMP before significant post-lease sale activities requiring Federal consistency review.

Cumulative Effects: There would be no cumulative effects on either the proposed sale or the ACMP. The rationale for this lack of cumulative impact on Yautat's district CMP is that sale 39 had not discoveries and has virtually no potential for development. As a result, there can be no coastal zone potential impact on Yakutat. Other OCS lease sales and activities in lower Cook Inlet and Kodiak are quite far from Yakutat and also quite outside the

jurisdiction of Yakutat's district or even regional CMP. As a result, OCS activities in such distant areas are not likely to have any cumulative effects on Yakutat's district CMP.

Unavoidable Adverse Effects: There are no anticipated unavoidable adverse effects on coastal zone management.

d. Impacts on Water Quality: Impacts on water quality are presented in the Final Environmental Impact Statement for the Gulf of Alaska, sale 39 (U.S. Department of the Interior, 1976). A summary of possible impacts on water quality is included in table III.A.2.d.-1.

During petroleum development, the water quality in the Gulf of Alaska would be altered and degraded to some degree. Presently, a near pristine environment exists in the Gulf of Alaska. Offshore, petroleum development, excluding a major oilspill, would result in localized degradation of the water quality in the vicinity of any permanent structure. A major oilspill reaching the coastline would have temporary, if not permanent, effects upon the water quality (through the mechanisms of being incorporated within the bottom sediments).

In the proposed lease area, time would be an essential factor in allowing the diffusion and dispersal of a major oilspill before possible contact with the coastline.

Conclusion: A major impact on water quality could occur within the confines adjacent to onshore petroleum activities.

The community of Yakutat is capable of, and willing to, expand the city water and sewer facilities in the event of further petroleum development. Cordova would experience more problems as the city services would prove inadequate under additional demands.

Cumulative Effects: The type of cumulative water quality effects possible from OCS development, and other actions in the Gulf of Alaska sale 39, include low level petroleum hydrocarbon releases, discharges of sanitary waste, and drilling muds and cuttings. The cumulative effects of these types of contaminants in marine receiving waters includes sublethal physiological and behavioral effects upon marine organisms.

However, any postulated cumulative effects from the above types of contaminants would most likely not occur in the proposed sale 55 area: the high energy system driven by the Alaska Current would move potential contaminant loadings northwesterly along the continental shelf and along the Aleutian Shelf.

In considering cumulative impacts on the water quality in the proposed sale 55 area, the following actions have been identified as contributing to marine water pollution: tanker traffic in the Gulf of Alaska, OCS sales 39, 46, CI, and 60, the Alpetco Refinery in Valdez, other commercial vessel traffic in the Gulf of Alaska, and timber harvesting in coastal southeastern Alaska.

The above findings on cumulative water pollution effects affecting proposed sale 55 apply also to various alternatives to the proposal, including Alterna-

tives II through V. Changes in the proposed sale 55 area would have no bearing on fate and cumulative effects of marine contaminants driven by the Alaska Current.

Unavoidable Adverse Effects: Formation water introduced into the water column would contribute to the deterioration of water quality by the addition of entrained liquid hydrocarbons, dissolved mineral salts, and the absence of dissolved oxygen. Pipeline construction and drilling operations would disturb bottom sediments and result in a temporary decrease in visibility. Onshore construction of a marine terminal and port facilities would result in adverse water quality. Drilling effluents containing caustic soda, fenochrome hydrosulfonate, and barium would cause water quality deterioration if introduced into the water column. A general contamination of confined areas adjacent to onshore petroleum storage and production facilities might be expected from chronic, low-level pollution. Extremely low to severe water quality degradation can result from an oilspill depending upon its trajectory and possible shoreline impact.

e. * Impacts on Air Quality: The quality of air in the proposed lease area could be, but is not expected to be, degraded from petroleum development. For a more comprehensive discussion on the sources of air pollution and their impacts on air quality, consult the Final Environmental Impact Statement, sale 39 (U.S. Department of the Interior, 1976). Additional detail on air quality of OCS activities can be found in section II. The DOI has published new air quality regulations under 30 CFR Part 250.57 to implement Section 5(a)(8) of the OCS Lands Acts Amendments of 1978. These regulations become effective June 2, 1980. Such regulations will undoubtedly mitigate substantially any potential impacts on air quality from petroleum development.

Conclusion: The proposed lease area is enveloped by a high energy environment. Due to the distance from shore, and the high rate of diffusion and dispersal of contaminants, little impact on the air in the communities and adjacent coastline is believed probable.

Cumulative Effect: Cumulative air quality effects are defined in terms of pollutant types and receptor types. Federal ambient air quality standards have been promulgated to protect human health (primary standards), as well as human welfare, protection of property, and the terrestrial environment (secondary standards). Cumulative air quality impacts associated with proposed sale 55 are presumed to be manifested onshore; no significant receptors would be located offshore.

For purposes of cumulative air quality assessment, the following actions are presumed to generate incremental air emissions in the Gulf of Alaska and its coastal environs: tankering of Trans-Alaska Pipeline crude oil, OCS sales 39 and 46, exploration and production activity, Alpetco Refinery in Valdez, timber harvesting in coastal areas, and other commercial vessel traffic in the Gulf of Alaska.

Cumulative air quality impacts are not expected to be significant, primarily because of the imposition of performance standards on new emissions sources: the application of Best Available Control Technology (BACT) by stationary source category, in conjuction with the dispersed nature of the emission

* Issue of Significant Concern

Table III.A.2.d.-1
Summary of Possible Impacts on Water Quality
For a Range of Proposed Activities

Activity	Maximum Amounts	Open Ocean Impacted	Duration	Frequency	Impact	Relative Severity
Oilspill:						
Case 1	100,000 bbl	Up to 500 mi^2	61 days to ? (lasting effects unknown)	Once every 7-10 yrs	Deterioration of water quality; uptake of hydrocarbons in water column in vicinity of spill landing	High; localized in vicinity of spill landing. Regional effects unknown
Case 2	100,000 bbl	Up to 500 mi^2	61 days spill; 22 days at sea	Once every 7-10 yrs	Deterioration of surface and near surface water quality over path of spill	High in vicinity of spill; beyond unknown
Case 3a	1,000 bbl	2 mi^2	3-4 days	Once every 1-2 yrs	"	"
3b	400 bbl ashore 300 bbl on sea	1 mi^2 1/2 mi^2	Length of lasting effects unknown	Unknown	Deterioration of water quality; uptake of hydrocarbons in water column in vicinity of spill landing	High; localized in vicinity of spill landing beyond unknown
Chronic low-level discharge	12,000 bbl	Gulf of Alaska	Production life, 25 yrs	Annually	Incorporation of hydrocarbons into water column	Unknown
Discharge of formation water	1.4 bbl	Local; platform locations	4th yr to life of field (25 yrs)	Throughout production phase	Local increase in salinity; concentrations of certain elements	Unknown

Continued

Table III.A.2.d.-1
Summary of Possible Impacts on Water Quality
For a Range of Proposed Activities--continued

Activity	Maximum Amounts	Open Ocean Impacted	Duration	Frequency	Impact	Relative Severity
Drill Cuttings	31,000-4,000,000 cu yds	Local platform locations	Drilling phase 3-10 yrs	Continuous during drilling	Local increase turbidity; heavy metals in sediments potentially introduced to water	Unknown
Drill mud	1,750-22,500 tons	"	"	"	"	"
Pipeline burial	.6 to 1.6 million cu yds of sediment	Local; pipeline routes	3-5 yrs	During pipeline burial	Local increase in turbidity	Low; temporary effect
Platform construction	No estimate available	Local; platform locations	3-10 yrs	During platform	"	"
Sewage discharge from onshore facilities and population growth	Negligible	Area adjacent to developed land	Life of field; 25 yrs	Life of field	Increase in heavy metals, BOD, fecal bacteria	Low

sources and "synoptic" climatic pattern, should result in ambient air quality which complies with national and state ambient standards.

If there is a possibility of air quality standards being violated in the future in the Gulf of Alaska, this would occur in Valdez (U.S. EPA, 1979). TAPS tanker loading, in conjunction with the Alpetco Refinery, would generate far greater emissions than offshore operations attributable to OCS sales 39 and 55 in the Gulf of Alaska.

Other air emission sources which could conceivably contribute to cumulative air quality effects in the coastal Gulf of Alaska, e.g., OCS leasing in Cook Inlet and northern Gulf of Alaska, other commercial vessel traffic, etc., are too dispersed to yield measurable concentrations of pollutants over trajectories of great distance.

Unavoidable Adverse Effects: Post-sale industrial activities would cause various types of emissions, but air quality impacts both onshore and offshore should be minor and short term. This would be due to the distance from shore, the moisture content of the air, the small extent of emission, and the existing wind patterns.

In case of a gas leak or gas well blowout, methane pollutants would volatilize quickly and drift away, or, if a fire resulted, products would consist mainly of carbon dioxide and water vapor.

Oil leaks and oilspills, not accompanied by fire, produce pollutants. Photochemical smog would be a possibility in the immediate offshore area. If any spill resulted in a fire, large amounts of particulate carbons and oxides of carbons, together with unknown amounts of sulfur oxides, nitrogen oxides, evaporated crude oil liquids, and partially oxidized compounds, would enter the air. Local air quality would be degraded during the period of the fire by the addition of particulate matter. Mitigating measures would not totally prevent the above occurrences. The unavoidable result would be a decrease in air quality which would vary with the magnitude of the incident and also would depend on the extent of mitigation by air quality regulations (sec. 5 (a) (8)).

f. Impacts of the Offshore Loading Scenario: The following impacts pertain only to effects of the potential use of an offshore marine loading terminal as described in the proposal in section I. The discussions of these impacts are in addition to previous impact discussions of the proposal and its primary scenario. Those impacts not appearing with the following were considered, but found not to be of sufficient intensity of impact to warrant further consideration on the impact of offshore loading.

Impacts of Significant Concern

* Impacts on the Lifestyle of Yakutat: A majority of the workers would be based on the offshore marine loading terminal. Approximately 80 workers would be based in Yakutat in 1981, rising to approximately 200 workers in 1987, and then dropping to approximately 40-50 workers in 1988 and throughout the life of the field. The marine service base, built for the 1976-77 exploration activity should have sufficient capacity, with minimal additions, to house the workers based in Yakutat.

The Yakutat airport would receive the brunt of the impacts on Yakutat as all workers would enter and leave the region through the airport. Subsistence activities would decrease to some extent as Yakutat residents engage in oil and gas employment and as subsistence animals move away from the exploration, development, and production activities. The present character of Yakutat would change to some degree with the activities; however, gross changes would not occur with the offshore marine loading terminal.

Conclusion: The effect of offshore loading and the enclave assumption would be to significantly moderate impacts on the lifestyle of Yakutat.

Cumulative Effects: The additive effect of this alternative with other activities cited in the cumulative effects of the proposal would undoubtedly result in a low to moderate impact on the lifestyle of Yakutat over the proposed life of the project.

Unavoidable Adverse Effects: If this alternative and enclave development were adequately implemented by all concerned parties, then the unavoidable adverse effects on the lifestyle of Yakutat would be low to moderate. With the bulk of workers offshore in this alternative, partial enclave conditions would be moderate to severe depending on previous city planning efforts and the implementation of local land use planning decisions.

* Impacts on the Local Economy of Yakutat: Where an offshore loading terminal is used instead of the Yakutat oil terminal, the results are somewhat similar to those described in Alternative IV (III.A.6.). In particular the movement of the fully enclaved case in port to an offshore enclave has no effect. The partially enclaved case is going to largely disappear as an option as operations people would go for the most part to Anchorage or Seattle. Thus, the economic effect is likely to be similar to the full enclave case in the proposal where only mild to moderate stimulus and slight dislocation occurs. A difference is that the service base workers in this alternative would be nonenclave and stimulative while the local government would suffer a

* Issue of Significant Concern

depressing loss of oil terminal tax revenues. Perhaps these two effects would cancel, yielding, something like the full enclave case in the proposal.

Conclusion: Economic effects of this alternatives are likely to be similar to the full enclave varient of the proposal and would be mild to moderately stimulative with little dislocation. The main difference is a large loss in local tax revenue and the introductin of nonenclaved service base workers.

Cumulative Effects: The cumulative or interactive impacts of local developments have been considered in the alternative and its conclusion above. In addition to these local cumulative or interactive impacts, there are interactions with major non-local developments to be considered. In general, however, interactions with major non-local development do not seem likely. For example, sale 39 offers no development potential and OCS sales 46, 60, and CI are too far away. Tankering of Beaufort Sea, Prudhoe Bay, Pacific LNG, and Alpetco resources seem unlikely to interact with the Yakutat economy except possibly in the commercial fishing area. Thus, no cumulative economic effects outside of those discussed in the locale of this alternative are foreseen.

Unavoidable Adverse Effects: No unavoidable adverse effects are expected from this proposal because impacts are likely to be mild to moderate.

* Impacts on Water Quality: Under the use of offshore loading, the same types of impacts on water quality that would pertain primarily to the offshore, as previously described in the Final Environmental Impact Statement for sale 39, would apply to the proposed lease area with an offshore marine loading terminal. Impacts on water quality in Yakutat would be substantially reduced because of the use of an offshore marine loading terminal.

During petroleum development, the water quality in the Gulf of Alaska would be altered and degraded to some degree. Presently, a near pristine environment exists in the Gulf of Alaska. Offshore, petroleum development, excluding a major oilspill, would result in localized degradation of the water quality in the vicinity of any permanent structure. A major oilspill reaching the coastline would have temporary, if not permanent, effects upon the water quality (through the mechanisms of being incorporated within the bottom sediments).

In the proposed lease area, time would be an essential factor in allowing the diffusion and dispersal of a major oilspill before possible contact with the coastline.

Conclusion: Under this alternative, water quality impacts would be further reduced because of the use of offshore loading.

Cumulative Effects: The cumulative impacts upon water quality in the Gulf of Alaska under offshore loading would be comparable to the proposal. Refer to sec. III.A.2.d. for a discussion of cumulative water quality effects under the proposal.

Unavoidable Adverse Effects: Under this alternative, any unavoidable adverse effects on water quality would occur in the offshore lease area because of the use of offshore loading.

* Issue of Significant Concern

Formation water introduced into the water column would contribute to the deterioration of water quality by the addition of entrained liquid hydrocarbons, dissolved mineral salts, and the absence of dissolved oxygen. Pipeline construction and drilling operations would disturb bottom sediments and result in a temporary decrease in visibility. Drilling effluents containing caustic soda, fenochrome hydrosulfonate, and barium would cause water quality deterioration if introduced into the water column. Extremely low to severe water quality degradation can result from an oilspill, depending upon its trajectory and possible shoreline impact.

* Impacts on Air Quality: Under the use of offshore loading, the same types of impacts on air quality as previously described in the Final Environmental Impact Statement for sale 39 would apply. In addition, the description of air quality emissions in section II provides a baseline of what could be typically emitted by the platforms. The DOI has published new air quality regulations under 30 CFR Part 250.57 to implement Section 5 (a) (8) of the OCS Lands Acts Amendments of 1978. These regulations become effective June 2, 1980 and would substantially prevent or mitigate any potential air quality impacts from petroleum development.

Conclusion: Under the use of offshore loading, there would not be any degradation of air quality in Yakutat.

Cumulative Effects: There would be no cumulative effects on air quality in Yakutat because of the use of offshore loading. Refer to sec. III.A.2.e. for a discussion of similar air quality effects in the Gulf of Alaska from other emission sources and to the discussion in section II. Other OCS sales and Valdez tanker traffic would not create any additive long-term effects on air quality either in the city of Yakutat or in the proposed lease area.

Unavoidable Adverse Effects: Under the use of offshore loading, there would be no unavoidable adverse effects on air quality in Yakutat, unless an LNG plant were constructed in Yakutat.

* Impacts on Commercial Fishing: Application of the offshore loading scenario could increase the probability of adverse impacts on commercial bottom fisheries by as mush as 3-69 percent. It probably would not appreciably affect salmon and crab fisheries which are closer to shore. Impacts on the fishery could result because of gear fouling and because of chronic low level contamination of boats, lines, and nets.

Conclusion: The net effect of an offshore loading terminal would probably be some increase in fising gear conflicts with tanker and support vessel traffic as well as an increased potential for an offshore tanker spill which could affect to some unquantifiable degree, the potential offshore bottom fishery.

Cumulative Effects: There would be no cumulative effects due to other OCS sales such as lower Cook Inlet, Kodiak, or the still active but dry sale 39 area in the northern Gulf of Alaska.

Only tanker traffic from Valdez has any proximity to the proposed lease area. If a spill resulted from this source in addition to a platform spill in the

* Issue of Significant Concern

proposed lease area, and both occurred in the same timeframe, then there could be an additive or cumulative oilspill effect on the commercial fisheries of the proposed lease area for sale 55; however, this event would be extremely unlikely.

Unavoidable Adverse Effects: The most probable effect would be chronic low-level oil contamination of the surface waters and mooring equipment in close proximity to the offshore terminal.

* Impacts on Endangered and Threatened Species: The specific endangered species of whales consists of: blue whale (Balaenoptera musculus), fin whale (Balaenoptera physalus), sei whale (Balaenoptera borealis), humpback whale (Megaptera novaeangliae), right whale (Eubalaena glacialis), gray whale (Eschrichtius robutus), and the sperm whale (Physeter catodon).

The use of offshore loading could increase the chances of whales coming in contact with oilspills in the offshore area since potential oilspill areas would probably be near the offshore loading barges.

Conclusion: The chances of whale-oilspill encounters may be increased by offshore loading. However, no adverse effects on endangered birds are anticipated.

Cumulative Effects: Offshore loading would not significantly add to the effects on endangered and threatened species by other activities in the Yakutat area. Such activities include TAPS tankering, commercial fishing, and OCS sales 39, 46, 60, and CI. No cumulative effects on endangered birds are expected from these various OCS sales.

Unavoidable Adverse Effects: The most significant unavoidable adverse effect on endangered whales would be their migratory passage through a major oilspill either in close proximity to an offshore loading terminal or a tanker spill near the offshore loading terminal. It is not anticipated that any adverse effects on endangered birds would occur because of the offshore loading.

* Issue of Significant Concern

Impacts of Secondary Concern

Impacts on Marine Habitats and Food Web Resources: The use of offshore loading would avoid serious potential impacts on the littoral and nearshore habitat. The use of offshore loading would actually alleviate a greater amount of impact on the littoral and nearshore habitat from the proposed leasing activities than the proposed exclusion of the inner shelf area.

If oil is loaded offshore, spills related to pipelines and transportation would probably occur near the center of the proposed lease area (T1 in oil-

spill trajectory model). In contrast, the other scenarios assume that oil is piped to shore and then tankered back offshore, so spills may occur along 2 routes near the coast (T4 and T5 oilspill trajectory model). There is a greater chance of spilled oil reaching shore with assumptions of other scenarios than with assumptions of offshore loading.

The offshore loading scenario would avoid much impact on the nearshore and littoral habitat.

Conclusion: The use of offshore loading would neither significantly affect nearshore coastal habitats along the Yakutat-Icy Bay coast nor pelagic habitat offshore.

Cumulative Effects: The cumulative impacts over the life of the field on the pelagic habitat should be no worse than the described impacts during any year of operation because of the steady rate of exchange of organisms in the pelagic habitat.

The cumulative impacts from other OCS lease sales and increased tanker traffic would not significantly affect the offshore benthic organisms.

Unavoidable Adverse Effects: There are not significant unavoidable adverse effects on either nearshore coastal habitats or pelagic habitats anticipated under this alternative.

Impacts on Fish Resources: The only potential impact on fish populations as a result of offshore loading would be potentially, in the event of a significant oilspill, on bottomfish spawning areas near the surface of the ocean.

Nearshore fish populations, especially salmon and crab, would probably not be much affected by the use of an offshore loading terminal.

Conclusion: The use of offshore loading would not significantly reduce estimated impacts on fish populations in the area.

Cumulative Effects: There would be some slight reduction of cumulative impacts primarily caused by the interaction of this alternative and the other ongoing or probable oil, gas, and refined product production and shipping areas in the Gulf of Alaska, on bottomfish species if offshore loading were used.

Unavoidable Adverse Effects: By using a processing and loading facility offshore, unavoidable impacts on bottomfish species may be incrased because of chronic pollutant events. However, this type of impact would be reduced for salmon and crab species, which are closer to shore.

Impacts on Birds: The use of offshore loading through moored barges may significantly reduce the chances of oilspills adversely impacting important marine bird colonies in Yakutat Bay, and reduce and and boat traffic as well as other human disturbances of bird colonies in Yakutat Bay.

Conclusion: Offshore loading would significantly reduce chances of oilspills reaching important coastal areas and reduce human disturbance of bird colonies in Yakutat Bay.

Cumulative Effects: Little additive effects of other OCS sale areas in CI, 60, 46, and 39 are expected on birds.

Unavoidable Adverse Effects: The only unavoidable adverse effect on birds would be the effect of a serious, acute tanker spill in close proximity to the offshore loading terminal in the presence of a significant offshore bird populations.

Impacts on Marine Mammals: Offshore loading of oil would prevent oil and gas activity from disturbing seal populations in Icy Bay, and lessen oil and gas activity disturbance in Yakutat Bay. Offshore loading would reduce the chances of oilspills from reaching important shoreline habitat and reduce the chances of food source contamination.

Conclusion: The use of offshore loading would further reduce potential impacts on marine mammals in the proposed sale area bu significantly reducing the chances of onshore or nearshore oil pollution impacts and human disturbances of large marine mammal populations and important habitat.

Cumulative Effects: The use of offshore loading would not significantly add to the effects of other OCS actions in the Yakutat area on marine mammals because of the reduction of onshore coastal facilities.

Unavoidable Adverse Effects: There would be very little unavoidable adverse effects on marine mammals under the use of offshore loading except in the case of an oilspill near the offshore loading terminal.

3. Alternative II - No Sale:

a. Impacts on the Biological Characteristics of the Affected Environment:

Impacts on Marine Habitats and Food Web Resources: Under this alternative of no action, there would be no adverse impacts on the marine habitats and food web resources, either cumulatively or otherwise, as a result of the proposal.

Impacts on Fish Resources: Under this alternative of no action, there would be no adverse impacts on the fish resources, either cumulatively or otherwise, as a result of the proposal.

* Impacts on Commercial Fishing: Under this alternative of no action, there would be no adverse impacts on the commercial fishing, either cumulatively or otherwise, as a result of the proposal.

Impacts on Birds: Under this alternative of no action, there would be no adverse impacts on avian species, either cumulatively or otherwise, as a result of the proposal.

Impacts on Marine Mammals: Under this alternative of no action, there would be no adverse impacts on the marine mammals, either cumulatively or otherwise, as a result of the proposal.

Impacts on Terrestrial Mammals: Under this alternative of no action, there would be no adverse impacts on the terrestrial mammals, either cumulatively or otherwise, as a result of the proposal.

* Impacts on Endangered and Threatened Species: Under this alternative of no action, there would be no adverse impacts on the endangered and threatened species, either cumulatively or otherwise, as a result of the proposal.

b. Impacts on the Affected Social and Economic Environment:

* Impacts on the Lifestyle of Yakutat: The population of Alaska will grow approximately 50 percent between 1978 and 2000 to 600,000 people (table III.A.3.b.-1). Anchorage will continue to be Alaska's major metropolitan area--financial, service, and transportation center, as well as business headquarters. The population will grow from 191,000 in 1978 to approximately 292,000 in 2000, an increase of 53 percent (table III.A.3.b.-1).

Yakutat's road-connected area population will increase by approximately 65 percent from 568 in 1978 to 934 in 2000 (table III.A. 3.b.-1). With improving economic opportunities and smaller families (Alaska Consultants, 1979) the percentage of Alaska Natives of the area population will probably decrease from 74 percent to about 60-65 percent in 2000. It is doubtful that the increase in population and decrease in the ethnic majority of the Tlingits will change the Tlingit's controlling voice in community affairs, nor the interest in the present culture and sense of close-knit community.

* Issue of Significant Concern

Table III.A.3.b.-1
Population Forecasts

Year	Alaska[1]/	Anchorage[1]/	Yakutat[2]/	
			Area	City
1980	407,511	186,047	604	425
1985	463,443	211,850	639	443
1990	503,767	234,021	746	497
1995	542,747	259,084	877	564
2000	600,386	291,754	934	594

1/ ISER, 1979

2/ Alaska Consultants, 1979

Yakutat's interest in maintaining and expanding fisheries locally, coupled with plans to rebuild the burned cold-storage plant should assure moderate population growth without OCS development.

The Yakutat Capital Improvement Plan, table III.A.3.b-2, lists priorities of city projects and their programmed construction starts.

It is doubtful that the general lifestyle of the people of Yakutat will change extensively in the next 20-25 years. City services and economic and recreational opportunities will increase to varying degrees. It is assumed that subsistence food gathering will fluctuate somewhat in response to population pressures, alternative sources of food, and/or income and individual and family preferences.

Conclusions: Under the alternative of no sale, there would be no adverse impact on the lifestyle of Yakutat.

Cumulative Effects: Under the no-action alternative, the proposal would not contribute to any additive effects of other ongoing activities on the lifestyle of Yakutat. The potential impacts from other OCS lease sales and development or conservation projects in the area as cited in the proposal can be expected to prevail in the no-sale case.

Unavoidable Adverse Effects: There are no anticipated unavoidable adverse effects on the lifestyle of Yakutat under the no-action alternative.

* Impacts on the Local Economy of Yakutat: In the current decade, Yakutat has rebounded vigorously from its post-war economic and population decline. This new trend can be accounted for by a number of factors. Chiefly, it is a result of generally better economic conditions and public facilities. Yakutat has been able to retain or attract a larger share of its indigenous population, as well as, some new residents. This basic trend is expected to persist under the assumptions of the no-sale case throughout the forecast period.

The forecast of Yakutat's future employment is based on certain assumptions about the dynamic factors influencing economic and demographic change. These assumptions are described below.

The base case forecast is broadly premised on the assumption that there will be no radical change in the structure of Yakutat's local economy and that recent trends will, more or less, continue into the foreseeable future. The overall trend is expected to be slow, steady growth, interrupted by spurts of growth as new employment opportunities stimulated by a developing bottomfishing industry are realized.

The growth sectors in Yakutat's economic base are seen to be in manufacturing, reflecting an expansion in Yakutat's traditional industries; namely, fishing and fish processing, logging, and tourism. Optimum use of Yakutat's traditional fisheries resources is seen as the principal factor in community growth with some addition of high unit value bottomfish.

* Issue of Significant Concern

Other resource-based industries (mining and agriculture) are expected to remain, as today, minor sources of local employment. These sectors now account for less than a dozen jobs.

Substantial employment growth is forecast in the service and trade sectors of Yakutat's economy, as the local economy matures and consolidates to supply locally a wider range of commercial services and to accommodate visitor traffic. This continues a trend that has been underway for some time. The transportation sector is expected to grow at a faster rate than the overall economy. This supposition is based, in part, on greater activity in the fish processing industry, and on a steadily rising level of outdoor recreational and tourist activities centered at Yakutat.

Contract construction industry employment will fluctuate more widely than any other aspect of the economy, rising sharply during periods when processing plant construction and related growth takes place, and falling off to a lower level between those periods.

Government will remain a major employer throughout the forecast period, although its share of total employment is expected to decline as the role of the private economy strengthens.

Forecast: The future employment forecast for Yakutat and the Yakutat area is summarized in table III.A.3.b.-3. Based on the base case, a growth in employment is predicted from 264 jobs in 1978 to 519 jobs in 2000, a cumulative increase of 255 jobs or 97 percent. The bulk of new employment is concentrated in the sectors of manufacturing, trade, government, and services which together account for more than three-quarters of all anticipated growth.

The no-sale case forecast for the Yakutat area reflects continued development of Yakutat's traditional industries; namely, fishing and fish processing, logging and wood processing, and tourism and recreation. This most probable forecast does not anticipate large-scale entry into deep-sea fishing and fish processing. It is rather a forecast wherein Yakutat residents are assumed to divert their land, labor, capital, and entrepreneurial talents toward the development of existing resources which are now being produced or used or which have been produced in the past. It is also anticipated that the village corporation formed under the Alaska Native Claims Settlement Act, the Yak-Tat-Kwaan, Inc., will play a major role in local development.

Fishing and Seafood Processing: Yakutat is the only community within the expansive fisheries area which extends from Cape Suckling to Cape Fairweather. However, a large share of the fisheries product harvested there is either not caught by local fishermen or is not processed at Yakutat, or both. Therefore, growth in fishing employment in Yakutat depends upon new resident entry into fishing, a lengthened fishing season (generally attained through fishing for other species), additions to the local fishing fleet and increased deliveries to the Yakutat plants from transient vessels fishing offshore from Yakutat.

It is assumed that a technologically advanced seafood processing plant will be constructed to replace the Yakutat cold storage plant destroyed by fire on May 13, 1977. An engineering/economic cost/benefit study is in progress to desig-

Table III.A.3.b.-2
Capital Improvement Priorities and Programmed Construction Starts
City of Yakutat

Priority	Projects	Programmed Construction Starts by Fiscal Year						
		1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	Deferred
1	Cold Storage Facility Redevelopment							x 1/
	Cold Storage Wharf Extension							x 1/
	Ocean Cape Dock Redevelopment			x 1/				
	Northern Area Playground		x					
	Airport Road/Situk Road Intersection Improvement	x						
	Water System Intertie with Service Base	x						
	Water and Sewer Extension along Situk Road	x						
	Restoration of Hillside Cuts	x						
2	Small Boat Harbor Facilities Expansion		x					
	Water and Sewer Extension to Small Boat Harbor			x				
	Porter's Hill Access Improvement		x					
	Monti Bay Access Improvement		x					
	Monti Bay Access Construction		x					
	Water and Sewer Extension along Situk Road and Related Improvements				x			
	Sandy Beach Park Development							
3	City Hall Construction		x					
	Bayview Drive Upgrading				x			
	Mallott Avenue Improvements					x		
	Ridge Road Improvements					x		
	Lost River Road Upgrading			x				

continued

Table III.A.3.b.-2
Capital Improvement Priorities and Programmed Construction Starts--continued
City of Yakutat

Priority	Projects	Programmed Construction Starts by Fiscal Year						
		1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	Deferred
4	Public Safety Building Renovation			x				
	City Garage Development				x			
	Community Recreation Center Development				x			
	Central Area Playground Development				x			
	Situk Road Improvements					x		
5	Day Care Center				x			
	Hill Street Improvements				x			
	Library/Museum Construction					x		
	School Area Athletic Field Development							x
	Old Boat Harbor Trail System Rehabilitation					x		
	Ankau Road to Cemetery Upgrading							x 2/
6	Special Education Classroom Construction						x	
	Shipyard Cove Park Development						x	
7	Hospital Construction							x
	Coast Guard/Old Army Spur Improvement							x 2/

1/ Deferred pending an immediate study of potential long-range general cargo facilities and fisheries plant locations.
2/ Deferred pending designation and an indication of increased activity.

Source: Alaska Consultants, Inc., 1978

Table III.A.3.b.-3
Forecast of Employment
Yakutat Area No-Sale Case

Industry	1979	1980	1985	1990	1995	2000
			Number			
Commodity Producing Industries	116	116	132	166	179	181
Agriculture, Forestry, and Fisheries	(40)	(44)	(50)	(52)	(58)	(62)
Mining	(2)	(2)	(2)	(4)	(6)	(6)
Manufacturing	(40)	(44)	(50)	(52)	(58)	(62)
Contract Construction	(40)	(20)	(20)	(40)	(25)	(20)
Distributive Industries	(87)	(95)	(133)	(163)	(199)	(208)
Transportation, Communications, and Public Utilities	(22)	(24)	(40)	(40)	(50)	(52)
Trade	(33)	(35)	(46)	(40)	(50)	(52)
Finance, Insurance, and Real Estate	(6)	(6)	(9)	(13)	(14)	(15)
Service	(26)	(30)	(38)	(52)	(60)	(64)
Government	85	90	100	110	123	130
Total Employment	288	301	365	439	501	519

Source: Alaska Consultants, Inc., 1979.

nate the most suitable long-term general cargo and fishing dock sites or multi-use site for the plant location.

The new plant is assumed to result in additions to the resident fleet during the tanner and dungeness crab seasons and function as a port of call for an increased number of trollers, resulting in more local seafood processing. In addition, Yakutat is assumed to attract the landing of more product from transient vessels fishing this area.

The long-term yield of salmon from the set net fishery is forecast to increase modestly here due in part to the 200-mile offshore limit imposed by the United States to limit the fishing of foreign vessels on the continental shelf and treaties further limiting salmon catches beyond the 200-mile limit. The effect of these increases is not seen as increasing the number of set net fishermen (agriculture, forestry, fisheries). It is, however, seen as increasing their disposable income. On the other hand, increased employment in fish processing and handling (manufacturing) is seen as increasing slightly.

The offshore salmon troll fishery has recently increased in importance in the Yakutat area, and Yakutat has acted as a port of call for several trollers. With improved docking and the addition of processing facilities at Yakutat, this fishery will increase in numbers of fish delivered at Yakutat, necessitating a small increase in fish processing employment (manufacturing).

Tanner crab landings in Yakutat are also forecast to increase during the planning period. This fishery is a recent addition in the offshore Yakutat area with the first substantial catches being taken during 1973. Yakutat now serves as home port for a crabber. Despite recent declines in tanner crab catches due largely to the imposition of a minimum legal size limit for male crabs in 1976, the Department of Fish and Game views the future of the tanner crab fishery in this area as good. With dock and plant improvements in Yakutat, some seasonal additions to the Yakutat crab fleet are assumed, thereby resulting in a modest increase in fishing employment (agriculture, forestry, and fisheries), while increased landings from resident and transient vessels are assumed to result in a modest growth in seafood processing employment (manufacturing).

Although the demand for dungeness crab from Alaska has suffered drastic yearly fluctuations based upon the level of catches and satisfaction of the market by West Coast fishermen and processors, the demand in the long-term for this species is forecast to increase and remain at a reasonably high level. The west coast is the principal market for dungeness crab. However, it is reasoned that as other Alaskan shellfish such as king and tanner crab reach optimum yield, new markets will be created for this excellent product. The increased demand is foreseen to be sufficient to justify the prices required for Alaskan fishermen and processors to catch and process more of this product. It is assumed that increased landings of dungeness crab will be made in Yakutat. Therefore, there will be some increase in employment handling and processing of this product.

With significant deep sea fishing forecast for the Gulf of Alaska, the future of the halibut fishery is at best uncertain. However, any loss of halibut

landings in Yakutat are seen to be replaced by landings of high unit value groundfish such as sablefish. In any case, the effects of these landings on employment will be minimal.

Other fisheries resources such as red and brown king crab, shrimp, scallops, and razor clams will contribute to a lesser extent to the Yakutat fishing and fish processing industry.

In summary, recent Federal laws and treaties providing for improved fisheries resource management, plus improved Alaska Department of Fish and Game management gained through greater experience, is assumed to result in a more dependable and larger harvest of fisheries resources over the long-range forecasting period.

With improvements in docks and fisheries plants assumed to result in increased fishing and fish landings at Yakutat, a modest growth in basic employment can be expected in fishing (agriculture, forestry, and fisheries) and fish processing (manufacturing), and lesser increases in basic employment in transportation, trade, services, and government. Most of the growth in fish processing is expected to take place in the early years upon completion of the rebuilding of the seafood processing plant. Thereafter, only small incremental increases in food processing employment are foreseen.

Logging and Wood Products: The present absence of logging and wood processing in the Yakutat area is not due to a lack of quantities of timber limiting harvesting on a sustained yield basis. The principal factors contributing to the current absence of this industry are related to uncertainties of land ownership and land status. However, these factors are assumed to be resolved in the near future with the conveyance of lands to the Yak-Tat-Kwaan, Inc. (and possibly also to the Sealaska Corporation), and the classification of remaining Federal lands under the Alaska Native Claims Settlement Act. The solution is assumed to make available lands for timber harvesting. However, despite the availability of substantial quantities of timber, only a modest, seasonal round logging operation will be initally undertaken during 1983. Logging is forecast to increase throughout the planning period, with a small mill to provide primary processing to be constructed during 1990-1991.

Tourism and Recreation: Most tourists come in the Yakutat area to take advantage of the area's exceptional hunting and fishing opportunities. Occasionally, mountain climbing groups use Yakutat as a base camp while others are simply interested in the scenery or in the town's Tlingit heritage.

In the future with the creation of the Wrangell-St. Elias National Park/ Preserve and the Glacier Bay National Park, it is assumed that greater numbers of tourists will visit Yakutat as a gateway into sections of these parks. However, although the increases in visitor traffic during the summer may be relatively large, tourism in Yakutat will remain highly seasonal. Thus, annual average basic employment, principally in the service but also the trade and transportation sectors, will be relatively small.

Government: Only a modest amount of growth is foreseen in basic employment in the government sector. Despite gains in Federal jobs resulting from

new employment with the Park Service and increases in Forest Service personnel, the closure of the U.S. Coast Guard's Ocean Cape Loran Station in December 1979, will in large part cancel these gains. Forecast increases in state and Federal employment will essentially be in response to services demanded due to local population growth. Most of this will be secondary employment and there will be economies of scale involved in providing the services demanded.

In summary, growth in basic employment will result mainly from utilization of the natural resources of the lands and waters of the Yakutat area. Although the growth may not be great in the absence of OCS development, it will be diversified and it will be long-term growth. Futhermore, there will be a diversity within growth sectors. For example, there will be a reasonable fisheries mix where once salmon alone sustained this industry.

In the principal sectors, employment growth in agriculture, forestry, and fisheries is forecast to average approximately 2 percent per year based almost exclusively on an increase in fishing. Manufacturing employment is forecast to increase at an average of approximately 5 percent per year based upon growth in seafood processing and logging and wood products activities. Heavy initial increases are forecast to result in seafood processing employment upon completion of the new processing plant, while later increases will result from the resumption of logging and the construction of a small mill around 1990-1991. Of course, growth in these sectors is assumed to be accompanied by growth in basic employment in the transportation sector and also in contract construction during plant construction.

An average growth rate in excess of 5 percent per year is forecast for the service sector due to increased basic employment in tourism and recreation services. This basic industry is assumed to contribute to a similar rate of growth in basic employment in the trade and transportation sectors.

Secondary (or Service) Employment: Since the existence of service employment is dependent upon expenditures of the basic sector, service employment can be derived roughly from basic employment through the use of a multiplier to elicit total employment. Total employment minus basic employment equals service employment.

The employment count by Alaska Consultants, Inc., during 1977 totaled 257 employees. Estimates of basic and service employees were 153 and 104 respectively. The multiplier was 1.68. Admittedly, this multiplier is reasonably high for a small, relatively isolated community. However, no attempt was made to trace intergovernmental transfer payments. Thus, some employment in local government which would have been basic employment was in fact classified as secondary employment. Therefore, the multiplier is somewhat overstated.

However, it is assumed that factors such as the increase in disposable incomes accruing to set net fishermen through increases in the number of fish harvested and a viable well-paying logging industry, will tend toward this reasonable high multiplier.

Service employment is then distributed using the tabulation of annual average full-time service employment by sector derived in 1977 as a guide. Adjust-

ments are made based upon observations of other similarly situated communities with similar populations and rates of growth.

Local Government Finances: Yakutat primarily draws its general fund revenues from local sources. Property taxes account for 39 percent of revenues, sales taxes for 14 percent, and miscellaneous other sources for 22 percent. Intergovernmental revenues amount to about 25 percent of total general fund revenues.

Using the assumptions explained in Alaska Consultants, Inc. (1979), Yakutat's general fund revenues are calculated, under the base case, to increase nearly sixfold, from an estimated $336,000 in fiscal year 1977/78 to $1,882,000 by 2000. The bulk (75 percent) of these revenues will come from local sources. This is shown in table III.A.3.b.-4.

School district revenues are expected to grow at a similar rate--from about $645,000 in fiscal year 1977/78 to about $2,857,000 by 2000. As is now the case, the State of Alaska is assumed to contribute nearly all (96 percent) school district revenues, with the remaining share split between local and Federal governments.

The no-sale case forecast of general fund operating expenditures explicitly assumes that the city will continue to provide more or less the same range and quality of public services now offered, at the same per capita cost. Thus, the operating budget basically varies with population growth adjusted for inflation. Over the forecast period, the operating budget grows at about the same sixfold rate that revenues grow.

Yakutat has historically been successful in obtaining Federal and state grants to defray the cost of capital projects. As a result, the city of Yakutat does not at present have any long-term indebtedness. Comparison of forecasted revenues and operating expenditures indicates that Yakutat will have a modest revenue surplus (about 15 percent of revenues) available for capital improvements or debt service.

Conclusions: The forecast for Yakutat under the no-sale case is for the continuation and expansion of the town's traditional economic base, emphasizing the fisheries and fish processing. The forecast of modest employment and income growth should call for only small increments of change in the community's infrastructure. Growth in itself does not stand out as a momentous factor for social or economic change, and such change as does occur, would likely be attributable to other causes. Since Yakutat presently succeeded in upgrading its community facilities to meet current and near future needs, it appears that the city will be able to maintain its standard of services and facilities within the framework of its present fiscal policies.

Cumulative Effects: The cumultive or interactive impacts of local developments have been considered in the alternative and its conclusion above. In addition to these local cumulative or interactive impacts, there are interactions with major non-local developments to be considered. In general, however, interactions with major non-local development do not seem likely. For example, sale 39 offers no development potential and OCS sales 46, 60, and

Table III.A.3.b.-4
Forecast of Revenues and Operating
Expenditures, No-Sale Case
City of Yakutat

Item	1979	1980	1985	1990	1995	2000
			Thousand Dollars			
General Fund Revenues:						
Property Tax	149	164	228	343	521	734
Other Revenues	234	257	358	539	815	1,148
Total	383	421	586	879	1,336	1,882
Operating Expenditures:						
City Operations	310	340	474	712	1,081	1,524
School Support	13	14	16	25	40	57
Total	323	254	490	737	1,121	1,581
Available for Capital Improvements:	60	60	96	142	215	301

Source: Alaska Consultants, Inc., 1979.

CI are too far away. Tankering of Beaufort Sea, Prudhoe Bay, Pacific LNG, and Alpetco resources seem unlikely to interact with the Yakutat economy except possibly in the commercial fishing area. Thus, no cumulative economic effects outside of those discussed in the locale of this alternative are foreseen.

Unavoidable Adverse Effects: There are no unavoidable adverse effects on the local economy of Yakutat under the no-sale case.

* Impacts on Cultural Resources: The alternative to cancel the proposed lease sale would essentially negate all significant adverse effects to the terrestrial archaeologic and historic sites, as well as known shipwrecks and potential archaeologic sites on the outer continental shelf.

The lack of impetus to survey and systematically collect cultural materials due to the lack of a proposal could negatively affect the knowledge of historic and prehistoric cultures of the region. This is not viewed as a significant impact due primarily to the undesirable effects of salvage archaeology.

Conclusions: The alternative to cancel the proposed lease sale would result in no significant adverse effects to cultural resources.

Cumulative Effects: The cancellation of the proposed lease sale would significantly reduce adverse effects to cultural resources.

Unavoidable Adverse Effects: The alternative to cancel the sale would result in no unavoidable adverse effects.

Impacts on Visual Resources: In the event of the cancellation of the sale, the area's current visual quality will remain unchanged.

Conclusions: There would be no visual resource impacts due to the proposal under this alternative.

Cumulative Effects: There would be no cumulative effects on the visual resources of the Yakutat area under this alternative.

Unavoidable Adverse Effects: There would be no unavoidable adverse effects on visual resources in the Yakutat area under this alternative.

Impacts on Recreation and Tourism: In a no-sale situation, the Yakutat area's recreational use should gradually increase. This rise in recreational activity would, in the main, be linked directly to an increasing abundance of the area's sport fish and game animals (see sec. II.C.5.).

Conclusions: There would be no recreation and tourism impacts under this alternative.

Cumulative Effects: There would be no cumulative effects on recreation and tourism under this alternative.

Unavoidable Adverse Effects: There would be no unavoidable adverse effects on recreation and tourism under this alternative.

* Issue of Significant Concern

Impacts on Wilderness Resources: In a no-sale situation, there would be no perceived impacts or modifications to present or proposed wilderness resources.

Conclusions: There would be no impacts on wilderness resources under a no-sale case.

Cumulative Effects: There would be no cumulative effects under a no-sale case.

Unavoidable Adverse Effects: There would be no unavoidable adverse effects under a no-sale case.

Impacts on Land Use:

Conclusions: Under this alternative of no action, the proposal would not impact land use.

Cumulative Effects: Under this alternative of no action, the proposal would not contribute to any additive effects on land use.

Unavoidable Adverse Effects: No unavoidable adverse effects on land use are anticipated under this no-action alternative.

c. Impacts of Coastal Zone Management:

Conclusions: Under this alternative of no action, the proposal would not impact the Coastal Zone Management Plan of Alaska, nor would the state CZM affect this alternative.

Cumulative Effects: Under this alternative of no action, the proposal would not contribute to any additive effects on the Coastal Zone Management Plan of Alaska.

Unavoidable Adverse Effects: No unavoidable adverse effects on the state's Coastal Zone Management Plan are anticipated under this no-action alternative.

d. * Impacts on Water Quality:

Conclusions: There would be no impacts on the water quality of Yakutat and surrounding coastal waters under this alternative.

Cumulative Effects: Under the no-sale alternative, there would be no cumulative impacts on water quality in Yakutat. According to CEQ Regulations, cumulative effects are defined in conjunction with the proposed action; when there is no proposed action, there are therefore no cumulative effects (40 CFR 1508.7).

Unavoidable Adverse Effects: Under the no-sale alternative, there would be no unavoidable adverse effects on the water quality of Yakutat.

* Issue of Significant Concern

e. * Impacts on Air Quality:

Conclusions: There would be no impact on the air quality of Yakutat and surrounding areas due to the proposal under this alternative.

Cumulative Effects: Under Alternative II, there would be no cumulative effects on the air quality in the Gulf of Alaska.

Unavoidable Adverse Effects: There would be no unavoidable adverse effects on the air quality of Yakutat and the surrounding areas.

* Issue of Significant Concern

4. Alternative III - Delay the Sale: This alternative considers an undetermined length of delay of the proposed action or any of its modifications as previously described in sec. I. The following describes the effects of such a delay on the more significant impacts of the proposed action.

a. Impacts on Biological Characteristics of the Affected Environment: The impacts of delaying the sale are approximately the same as described for Alternative I with the following marginal changes.

Impacts on Marine Habitats and Food Web Resources: Of all the impacts on the marine habitats (pelagic, benthic, nearshore, and littoral), only 2 impacts are relatively large-scale or long-term. One impact is that the pelagic organisms in nearshore waters will probably be affected for a year or longer by an oilspill sometime during the life of the project. The second major impact is that the flesh of commercially important benthic (bottom) fish and shellfish may be tainted by spilled hydrocarbons. While the latter may not involve many animals, it could lead to a large-scale consumer avoidance of fishery products. The magnitude of both of these impacts are discussed further in the following section (Impacts on Fish Resources) and sec. III.A.2.b., Impacts on the Local Economy of Yakutat.

Conclusion: None of the impacts of hydrocarbons on the pelagic habitat should be severe.

Cumulative Effects: The cumulative impacts over the life of the field on the pelagic habitat should be no worse than the described impacts during any year of operation because of the steady rate of exchange of organisms in the pelagic habitat.

The cumulative impacts from increased tanker traffic or other OCS sales should not significantly affect the offshore benthic organisms.

Unavoidable Adverse Effects: The combined impacts of all the factors are unknown, but no serious adverse impacts are anticipated.

Impacts on Fish Resources: The major effect a delay of sale would have is that of postponing the impacts identified in sec. III.A.2.a. on the fish resources of the area. There could be some lessening of impact because of better understanding of where the resources are, increased technological advances in pollution prevention and cleanup, and increased knowledge of interactions between oil and gas and fish resources. These items are all probable and have a slightly higher chance of occurring than not occurring.

Conclusion: Delay of sale may cause some slight reduction of impacts. No one adverse impact can be singled out at this time to be particularly less severe than any other.

Cumulative Effects: A delay-of-sale may enable cumulative effects and companion mitigating resources to be better identified. The question of oil and/or gas production from sale 39, proposed sales near Cook Inlet/Kodiak, and the proposed refinery near Valdez, may be answered by then, which would change the probability of impact from the area.

Unavoidable Adverse Effects: There could be some slight lessening of impacts from delaying the sale. This lessening would be similar to that listed under the major discussion of this section. No specific impact or degree of relief can be identified at this time.

* Impacts on Commercial Fishing: Delaying the sale would cause little impact change from that described in sec. III.A.2.b. on commercial fishing. The crab fishing may be better established and more able to define specific fishing areas which could reduce gear loss. Technological advances in exploration and development activities may be made which would reduce pollution events and thereby reduce gear damage and lost fishing time. Other similar changes could be made, but are too nebulous to list.

Conclusion: Delaying this sale could reduce some impacts slightly. The specific impact and the amount of reduction cannot be determined at this time.

Cumulative Effects: A delay-of-sale may enable cumulative impacts from the above mentioned areas and companion mitigating measures to be identified. This would reduce impacts identified elsewhere in this statement.

Unavoidable Adverse Effects: Delay-of-sale would postpone these impacts. This could have the effect of reducing the impacts through increased knowledge and better technology. It could also increase impacts because of increased conflicts with larger commercial fishing and increased needs of the fishermen.

Impacts on Birds: Under this delay-of-sale alternative, projected impacts would be the same as those previously described under the proposal (Alternative I). This delay alternative would only postpone the time of potential impact on birds to some future timeframe.

Conclusion: Under this delay-of-sale alternative, the same impacts as described under the proposal would occur, but later in the future.

Cumulative Effects: The additive effect of the proposal, and other activities in the proposed lease area, would be the same under this delay-of-sale alternative.

Unavoidable Adverse Effects: The unavoidable adverse effects on birds under this delay-of-sale alternative would be the same as those described under the proposal, but occurring at some later time in the future.

Impacts on Marine Mammals: Under this delay-of-sale alternative, projected impacts would be the same as those previously described under the proposal (Alternative I). This delay alternative would only postpone the time of potential impact on marine mammals to some future timeframe.

Conclusion: Under this delay-of-sale alternative, the same impacts as described under the proposal would occur, but later in the future.

Cumulative Effects: The additive effect of the proposal, and other activities in the proposed lease area, would be the same under this delay-of-sale alternative.

* Issue of Significant Concern

Unavoidable Adverse Effects: The unavoidable adverse effects on marine mammals under this alternative would be the same as those described under the proposal, but occurring at some later time in the future.

Impacts on Terrestrial Mammals: Under this delay-of-sale alternative, projected impacts would be the same as those previously described under the proposal (Alternative I). This delay alternative would only postpone the time of potential impact on terrestrial mammals to some future timeframe.

Conclusion: Under this delay-of-sale alternative, the same impacts as described under the proposal would occur, but later in the future.

Cumulative Effects: The additive effect of the proposal, and other activities in the proposed lease area, would be the same under this delay-of-sale alternative.

Unavoidable Adverse Effects: The unavoidable adverse effects on terrestrial mammals under this alternative would be the same as those described under the proposal, but occurring at some later time in the future.

* Impacts on Endangered and Threatened Species: Under this delay-of-sale alternative, projected impacts would be the same as those previously described under the proposal (Alternative I). This delay alternative would only postpone the time of potential impact on endangered species to some future timeframe.

Conclusion: Under this delay-of-sale alternative, the same impacts as described under the proposal would occur, but later in the future.

Cumulative Effects: The additive effect of the proposal, and other activities in the proposed lease area, would be the same under this delay-of-sale alternative.

Unavoidable Adverse Effects: The unavoidable adverse effects on endangered species under this alternative would be the same as those described under the proposal, but occurring at some later time in the future.

b. Impacts on the Affected Social and Economic Environment:

* Impacts on the Lifestyle of Yakutat: Delaying the sale would give Yakutat more time to elaborate and evaluate options for development available to the community, to choose the best potential path of development under available options, and to plan and prepare accordingly for the locally perceived effects of the sale. The additional preparation time, if used for such planning purposes, could reduce the uncertainty on the range of options available to the community in maintaining the small-scale village lifestyle of Yakutat. Accordingly, there could be a significant impact on Yakutat local government to carry out specific planning studies if the time were used for such purposes and the financial means were available to carry them out.

Conclusion: Under the delay the sale alternative, impacts on the lifestyle of Yakutat could be significantly moderated if the city used the time to elaborate and clarify planning options.

* Issue of Significant Concern

Cumulative Effects: The additive effects of increased population associated with fisheries expansion, tourism, forest products development, or other expansions of the local or regional economy, as well as the projects cited in the proposal, could perhaps divert some city attention from planning for major OCS impacts although this is not likely to occur.

Unavoidable Adverse Effects: If enclave development is adequately implemented by all concerned parties, then the unavoidable adverse effects on the lifestyle of Yakutat will have been moderated. If the full enclave is not enforced during potential OCS development phases, a partial enclave case would ensue with a number of adverse effects to the Yakutat lifestyle.

* Impacts on the Local Economy of Yakutat: The economic impacts of this alternative are very similar to those in the proposal, Section III.A.2., because delay does not change the impacts perceptively.

Conclusion: Local economic impacts include mild to moderate economic stimulous in the most likely full enclave case and range to severe boom conditions in the less likley partial enclave case. Dislocations would be aggravated in either case if industry and local government do not pursue purposely nondisruptive spending policies. In both case giant increases in local revenues occur.

Cumulative Effects: The cumultive or interactive impacts of local developments have been considered in the alternative and its conclusion above. In addition to these local cumulative or interactive impacts, there are interactions with major non-local developments to be considered. In general, however, interactions with major non-local development do not seem likely. For example, sale 39 offers no development potential and OCS sales 46, 60, and CI are too far away. Tankering of Beaufort Sea, Prudhoe Bay, Pacific LNG, and Alpetco resources seem unlikely to interact with the Yakutat economy except possibly in the commercial fishing area. Thus, no cumulative economic effects outside of those discussed in the locale of this alternative are foreseen.

Unavoidable Adverse Effects: There are probably only mild to moderate unavoidable adverse economic effects from this alternative as in the proposal case because of the petroleum employment enclave option apparently available to the local government.

* Impacts on Cultural Resources: The following dicussions regarding potential impacts on cultural resources assume that the proposed committed mitigating measure (sec. I.B.1.b., Stipulation for Protection of Cultural Resources) would be in effect.

The major effect a delay in the proposed lease sale would have on terrestrial archaeologic and historic sites is the postponing of the impacts identified in III.A.2.b., Impacts on Cultural Resources. There could be some lessening of the impacts due to the potential for additional surveys. Such surveys could increase the knowledge of cultural resources in the region and facilitate a more reliable estimate of potential impacts.

* Issue of Significant Concern

Conclusion: Delay-of-sale may cause a slight reduction of impacts to cultural resources. The probability of adverse effects resulting from this alternative is still considered relatively high.

Cumulative Effects: A delay of the sale may enable a better identification of cumulative effects and mitigating measures. The additional time may also allow for adequate assessment of the oil and gas potential of the area leased in sale 39.

Unavoidable Adverse Effects: There could be some slight lessening of impacts due to this alternative. It is anticipated that significant adverse impacts would still occur.

Impacts on Visual Resources: The results of such a delay would essentially be the same as those outlined in sec. III.A.2.b.

Conclusion: The least of the visual impacts would occur within the area of the Yakutat Forelands. Adverse climate, distance, and changes in vegetation would largely eliminate the negative visual impacts of the offshore platforms. The most prominent case of visual pollution would occur in and around the township of Yakutat, although the use of natural vegetation to screen the facilities and the burial of onshore pipelines would mitigate some adverse effects.

Cumulative Effects: The cumulative effect on visual resources in the Yakutat coastal area would be substantial over the life of the proposed project.

Unavoidable Adverse Effects: The unavoidable adverse effects of the proposal on the visual resources of the Yakutat coastal area would be severe because of the long-term degradation of the visual quality of undeveloped coastal areas.

Impacts on Recreation and Tourism: In a delay-of-sale situation, the results would be the same as those listed in sec. III.A.2.b., Impacts on Recreation and Tourism, under the proposal.

Conclusion: Properly handled, OCS development would have only short-term adverse impacts on the area's recreational use. These adverse impacts would be related to construction activities and would cease upon its completion.

Cumulative Effects: Cumulative impacts on recreation and tourism in the Yakutat area, would not be significant, assuming an enclave style of development.

Unavoidable Adverse Effects: There would be no unavoidable adverse effects on recreation and tourism in the Yakutat area, assuming an enclave style of development.

Impacts on Wilderness Resources: Impacts perceived under this scenario would be largely those expressed in sec. III.A.2.b.

Conclusion: OCS development under this scenario would have only a minor impact on wilderness values.

Cumulative Effects: Wilderness resources would not suffer substantial cumulative effects, except in the case of visual diminution (see Impacts on Visual Resources).

Unavoidable Adverse Effects: This alternative would represent the intrusion of man on a permanent basis into an area in which he has previously been a transient.

Impacts on Land Use: Under this delay-of-sale alternative, projected impacts would be the same as those previously described under the proposal (Alternative I). This delay alternative would only postpone the time of potential impact on land use to some future timeframe.

Conclusion: Under this delay-of-sale alternative, the same impacts as described under the proposal would occur, but later in the future.

Cumulative Effects: The additive effect of the proposal, and other activities in the proposed lease area, would be the same under this delay-of-sale alternative.

Unavoidable Adverse Effects: The unavoidable adverse effects on land use under this alternative would be the same as those described under the proposal, but occurring at some later time in the future.

c. * Impacts on Coastal Zone Management: The State of Alaska, on behalf of the the city of Yakutat, has requested a delay in the proposed lease sale. The State has requested a one-year delay in order that the District Coastal Management Program (CMP) for the city could be completed before the occurrence of the lease sale. The delay would provide additional opportunity for Yakutat to prepare a regional CMP for the unorganized borough territory from Cape St. Elias to Dry Bay.

A delay-of-sale could be beneficial to the city of Yakutat's District CMP development. However, such a delay is not essential, or even necessary, to assure the intregrity of Yakutat's CMP. See sec. III.A.2.e.

Conclusion: A delay-of-sale alternative could be beneficial to Yakutat's development of a District Coastal Management Program. However, such a delay is not essential, or even necessary, to maintain the integrity of the Yakutat District CMP.

Cumulative Effects: Delaying the sale until a district or regional CZM plan is developed would have no adverse cumulative effects. The effects can only be positive in that options for the future development of the area would be discussed and analyzed.

Unavoidable Adverse Effects: There are no anticipated unavoidable adverse effects on coastal zone management.

* Issue of Significant Concern

d. * Impacts on Water Quality: Impacts on water quality are presented in the Final Environmental Impact Statement for the Gulf of Alaska, sale 39 (U.S. Department of the Interior, 1976). A summary of possible impacts on water quality is included in table III.A.2.d.-1.

Under this delay-of-sale alternative, none of the water quality impacts as described in the Final Environmental Impact Statement for sale 39 would occur until sometime in the future.

Conclusion: Any impacts on water quality in Yakutat would be delayed to some time in the future under this alternative.

During petroleum development, the water quality in the Gulf of Alaska would be altered and degraded to some degree. Presently, a near pristine environment exists in the Gulf of Alaska. Offshore, petroleum development, excluding a major oilspill, would result in localized degradation of the water quality in the vicinity of any permanent structure. A major oilspill reaching the coastline would have temporary, if not permanent, effects upon the water quality (through the mechanisms of being incorporated within the bottom sediments).

In the proposed lease area, time would be an essential factor in allowing the diffusion and dispersal of a major oilspill before possible contact with the coastline.

Cumulative Effects: Under Alternative III, Delay of Sale, cumulative effects upon water quality in the Gulf of Alaska would be comparable to the proposal, Alternative I. There is no means for differentiating cumulative effects between the proposal and Alternative III. Refer to sec. III.A.2.d. for a discussion of cumulative water quality effects under the proposal.

Unavoidable Adverse Effects: Formation water introduced into the water column would contribute to the deterioration of water quality by the addition of entrained liquid hydrocarbons, dissolved mineral salts, and the absence of dissolved oxygen. Pipeline construction and drilling operations would disturb bottom sediments and result in a temporary decrease in visibility. Onshore construction of a marine terminal and port facilities would result in adverse water quality. Drilling effluents containing caustic soda, fenochrome hydrosulfonate, and barium would cause water quality deterioration if introduced into the water column. A general contamination of confined areas adjacent to onshore petroleum storage and production facilities might be expected from chronic, low-level pollution. Extremely low to severe water quality degradation can result from an oilspill depending upon its trajectory and possible shoreline impact.

e. * Impacts on Air Quality: The quality of air in the proposed lease area would be degraded from petroleum development. For a more comprehensive discussion on the sources of air pollution and their impacts on air quality, consult the Final Environmental Impact Statement for sale 39 (U.S. Department of the Interior, 1976), and the discussion on typical air quality emissions in section II.

* Issue of Significant Concern

Under this delay-of-sale alternative, none of the air quality impacts as described in the Final Environmental Impact Statement for sale 39 would occur until some time in the future.

Conclusion: The proposed lease area is enveloped by a high energy environment. Due to the distance from shore, and the high rate of diffusion and dispersal of contaminants, little impact on the air in the communities and adjacent coastline is believed probable, subsequent to this alternative.

Cumulative Effects: A delayed sale would displace cumulative effects on air quality into the future. The cumulative effects upon air quality would result from shore based refineries. If emission controls are installed and function properly at point sources, harmful emissions should not be significant. A major reduction in air quality could result from malfunctioning emission controls at point sources. The reduction, however, would be temporary. The amount of air pollution resulting from additional concentrations of people and vehicles would be insignificant. Refer to sec. III.A.2.e. for a discussion of similar air quality effects in the Gulf of Alaska from other emission sources.

Unavoidable Adverse Effects: The unavoidable adverse effects on air quality would result from degradation of air quality during and subsequent to platform fires, depending on their magnitude, LNG operations, and loading and unloading of oil tankers in Yakutat.

5. Alternative IV - Modify the Sale by Deletion of the Nearshore Area: This alternative proposes to delete some of the nearshore tracts of the proposed lease area as described in sec. I. The following describes the more significant impacts which are anticipated to occur under this alternative. Ecological impacts are discussed first. These are followed by the key socioeconomic impacts, leading off with the impact on the lifestyle of Yakutat. Many of the subsequent socioeconomic impacts contribute directly and indirectly to the impact on the lifestyle of Yakutat.

Figure III.A.5.-1 shows the proposed tract deletions for this alternative. This figure also shows the percent chance of a hypothetical oilspill impacting various points along the shoreline. These results were derived from the USGS oilspill trajectory analysis (USGS Open File Report No. 79-1784). The 3, 10, and 30 probabilities of impact on the shoreline indicate the percent chances of a hypothetical spill hitting the beaches after 3 days, 10 days, and 30 days of drifting at sea.

For crude oil, most of the toxic effects of the volatile fractions have usually dissipated 10 days after a spill. This figure, summarizing oilspill impact probabilities on the shoreline, provides a ready reference for use with the discussions of the various ecological and lifestyle impacts that follow.

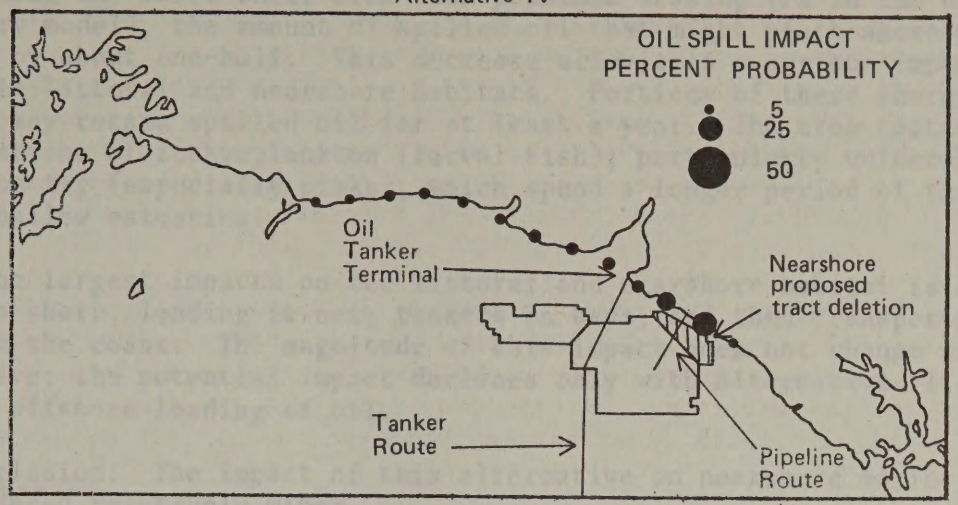
a. Impacts on the Biological Characteristics of the Affected Environment:

Impacts on Marine Habitats and Food Web Resources: There are 2 main differences between the impacts of Alternative IV and of those described for the proposal (Alternative I). The first difference is in the amount of impact on the inner shelf benthos. The inner shelf area is generally less than 100 m deep, and has high concentrations of benthic invertebrates (see Graphic No. 3 for Marine Habitats and Food Web Resources). Because the inner shelf area is not included under Alternative IV, there would be much less impact on the benthos. (A pipeline route may be dredged across the bottom of the inner shelf area.)

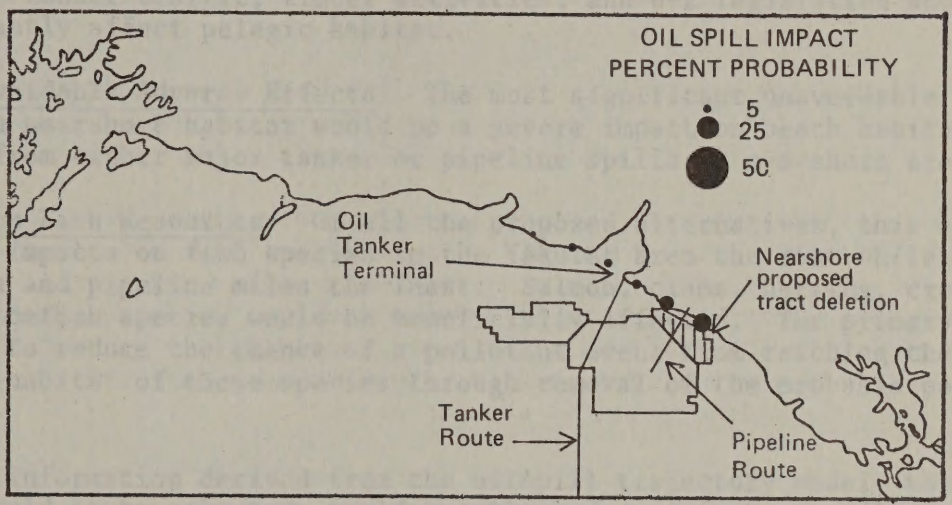
However, the impacts associated with the proposal are considered minor; therefore, the change in degree of impact between this alternative and the proposal is not considered very important.

A second difference will be in the amount of impacts on the littoral and nearshore habitat. Under Alternative IV, the proposed lease area would be at least 25 km from the coast, not 5 km as with Alternative I. The increased distance of the proposed lease area from the coastline will decrease the chance that oilspills from blowouts and platform fires will reach the littoral and nearshore habitat. The relationship of the amount of an oil slick that might reach shore to the distance from shore is described in sec. III.A.1.d. on the oilspill trajectory model and is shown in fig. III.A.2.a.-2, Dependence of Percentage of a Spill Impacting Shore on the Distance from Shore of the Hypothetical Spill Locations.

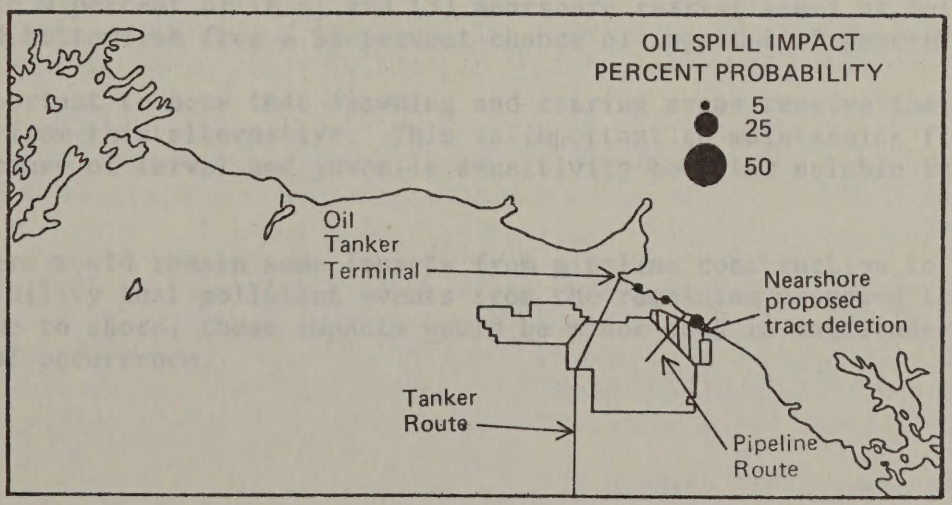
Figure III. A. 5. – 1
Alternative IV



DAY 30

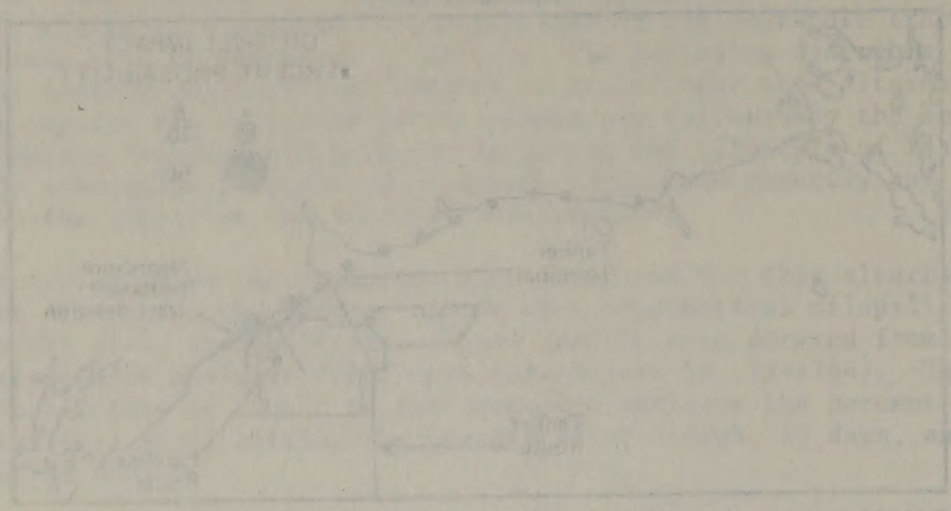


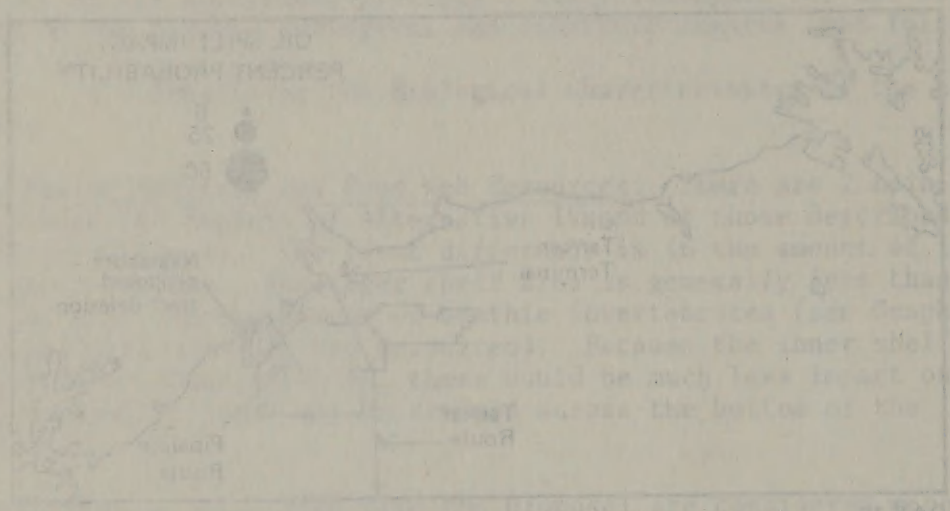
DAY 10

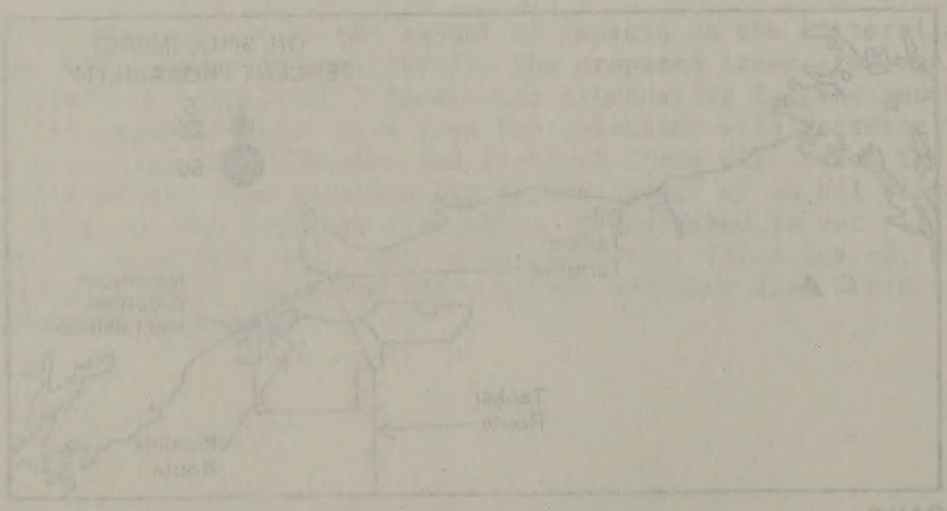


DAY 3

Source: USGS Open File Report No. 79-1784, 1979







By excluding the inner shelf area from possible leasing (P1 in the oilspill trajectory model), the amount of spilled oil that might reach shore would decrease by about one-half. This decrease alleviates a serious impact on the vulnerable littoral and nearshore habitats. Portions of these shoreline habitats may retain spilled oil for at least a year. The area contains dense concentrations of icthyoplankton (larval fish); particularly vulnerable are the salmon fry (especially pinks), which spend a longer period of their lives in the shallow estuaries.

One of the largest impacts on the littoral and nearshore habitat is the piping of oil to shore, loading it onto tankers in bays, and then transporting it away from the coast. The magnitude of this impact does not change with this alternative; the potential impact declines only with Alternative VI, which proposes offshore loading of oil.

Conclusion: The impact of this alternative on nearshore marine habitats is considered relatively minor.

Cumulative Effects: The cumulative impacts from other OCS lease sales, increased tanker traffic, timber activities, and d-2 legislation should not significantly affect pelagic habitat.

Unavoidable Adverse Effects: The most significant unavoidable adverse effect on nearshore habitat would be a severe impact on beach habitats resulting from either major tanker or pipeline spills in nearshore areas.

Impacts on Fish Resources: Of all the proposed alternatives, this one reduces probable impacts on fish species in the Yakutat area the most while reducing sale area and pipeline miles the least. Salmon, clams, herring, crab, and some bottomfish species would be beneficially affected. The primary effect would be to reduce the chance of a pollutant event from reaching the nearshore critical habitat of these species through removal of the probable pollutant source.

Based on information derived from the oilspill trajectory model, this alternative, should it be selected, would greatly reduce impacts on: (1) salmon spawning areas, from a 55 percent chance of impact to 4 percent or less; (2) nearshore rearing areas for salmon and clams from a 32 percent chance of impacts to 4 percent or less; and (3) nearshore rearing areas of herring, crab, and bottomfish from a 36 percent chance of impact to 5 percent or less.

It is important to note that spawning and rearing areas receive the primary benefits from this alternative. This is important to maintaining fish populations because of larval and juvenile sensitivity to water soluble fractions of oil.

While there would remain some impacts from pipeline construction to shore and the possibility that pollutant events from the remaining proposed lease area would come to shore, these impacts would be minor both in magnitude and length of time of occurrence.

Conclusion: Selection of Alternative IV would greatly reduce adverse impacts on most of the fish species inhabiting the Yakutat area. Only groundfish species would retain the original severity of impact.

Cumulative Effects: The estimated cumulative impacts from oil and refined product tankering from Valdez and Cook Inlet, and probable production-shipment of crude from proposed sale areas in the gulf discussed previously would be reduced by a significant amount should this alternative be selected. Salmon, herring, clams, and crab species would derive the greatest benefit.

Unavoidable Adverse Effects: The unavoidable adverse impacts identified in the discussion on impacts on fish resources under Alternative I could be greatly lessened by selecting Alternative IV. The remaining impacts would be attributable to the pipeline, the onshore facilities, and the slight possibility that pollutant events from the remaining proposed lease area would reach shore.

* Impacts on Commercial Fishing: Impacts could be reduced on loss of fishing gear and fishing area, and because fish population impacts would be reduced, catches would be less effected.

The oilspill trajectory analysis shows that should this alternative be selected, the probability of impacts on crab, salmon, and some inshore bottomfish species would be reduced from 80-27 percent or less. The major bottomfishing (including halibut) area impacts would not be reduced by this alternative.

It is estimated that selection of this alternative would reduce the 1 salmon and 1 crab fishermen's yearly loss attributed to the proposal. Because there is still a 27 percent or less chance of impact from this proposal there would be some adverse impacts on the commercial fisheries. These impacts cannot be quantified any further at this time. However, these impacts would remain unchanged if the impact of competition for space, material and labor were the same as in the original proposal.

Conclusion: Acceptance of Alternative IV would significantly reduce impacts on the Yakutat commercial fisheries, particularly in reducing gear, catch, and fishing area loss. Impacts associated with shore based competition and pollution events would remain unchanged.

Cumulative Effects: Cumulative impacts from crude oil and refined product shipment elsewhere in the Gulf of Alaska would be reduced by the same amount as indicated above.

Unavoidable Adverse Effects: Commercial fishing impacts associated with shore based competition and some (reduced) gear loss would remain should this alternative be selected.

Impacts on Birds: The degree and chance of impacts on marine birds and waterfowl would be reduced under this alternative by the deletion of nearshore tracts south of Yakutat Bay. There would be potentially less air and boat traffic near coastal nesting and molting habitat. Also, the chances of bird-platform collisions would be reduced. Chances of oil contamination of near-

* Issue of Significant Concern

shore habitat, oilspill-bird contamination of nearshore habitat, and oilspill-bird contacts would be reduced.

Conclusion: Alternative IV should reduce the chances of oil contamination impacts on birds in the nearshore and shore areas, reduce the amount of traffic disturbances of coastal habitat, and reduce bird-platform collisions.

Cumulative Effects: Alternative IV would not appreciably add to the effects of other activities in the Yakutat area on birds.

Unavoidable Adverse Effects: Under Alternative IV, only a relatively small number of birds would be adversely affected by an oilspill reaching the shore.

Impacts on Marine Mammals: The deletion of nearshore tracts in this alternative would reduce the air and boat traffic disturbances of seal and sea lion pupping and hauling grounds along the nearshore areas south of Yakutat Bay, especially the important seal habitat areas in the Dangerous River Delta and Dry Bay. The chances of oil contamination of these habitat areas would be reduced, and the chances of seal contact with oilspills should be lessened.

Conclusion: Alternative IV should reduce potential impacts on marine mammals by reducing traffic disturbances of important coastal seal and sea lion habitat in the proposed sale area, and reduce the chance of oil contamination of seals and sea lions, as well as important habitat in these areas.

Cumulative Effects: Alternative IV would not significantly contribute to the effects of other activities in the Yakutat area on marine mammals.

Unavoidable Adverse Effects: The unavoidable adverse effect on marine mammals under this alternative would be minor because of reductions of effects on seals, sea lions, and pinniped habitat.

Impacts on Terrestrial Mammals: The impacts on terrestrial mammals should be the same with Alternative IV as in the proposed action.

Conclusion: The impacts of Alternative IV on terrestrial mammals should be the same as that described in the proposal.

Cumulative Effects: Alternative IV would not significantly add to the effects of other activities in the Yakutat area on terrestrial mammals.

Unavoidable Adverse Effects: Unavoidable adverse effects on terrestrial mammals because of oil and gas activities under this alternative would be insignificant.

* Impacts on Endangered and Threatened Species: The specific endangered species of whales consists of: blue whale (Balaenoptera musculus), fin whale (Balaenoptera physalus), sei whale (Balaenoptera borealis), humpback whale (Megaptera novaeangliae), right whale (Eubalaena glacialis), gray whale (Eschrichtius robustus), and the sperm whale (Physeter catodon).

* Issue of Significant Concern

Available information suggests that many of the endangered whales move throughout the proposed lease area on a general basis during their migration periods. They are highly mobile mammals.

The deletion of nearshore tracts in this alternative may reduce the disturbance of endangered cetaceans, especially whales that migrate closer to shore such as the gray whale. The chances of direct contact between oilspills and whales, and the contamination of food sources, will also be reduced to a certain extent.

Conclusion: Alternative IV should reduce the potential adverse impacts on endangered cetaceans, especially those species and numbers that feed and migrate through the nearshore tract areas such as the gray whale.

Cumulative Effects: Alternative IV would not significantly add to effects of other activities in the Yakutat area. Such activities include TAPS tankering, commercial fishing, and OCS sales 39, 46, 60, and CI.

Unavoidable Adverse Effects: Under this alternative, unavoidable adverse effects on migrating endangered and threatened whales in coastal waters are expected to be relatively minor because of the proposed deletion of nearshore tracts.

b. Impacts on the Affected Social and Economic Environment:

* Impacts on the Lifestyle of Yakutat: Under Alternative IV, the impacts on the lifestyle of Yakutat would be the same as those described as a result of the proposal in sec. III.A.2.b. Deletion of the nearshore tracts under this particular alternative would probably not significantly affect the lifestyle of Yakutat, except to reduce potential nearshore fishing vessel conflicts with OCS activities.

Conclusion: If the assumption of an enclave style of development is enforced, then overall impacts on the lifestyle of Yakutat would be significantly reduced. If, however, the enclave assumption is not adequately implemented, then the construction and operation of onshore oil and gas facilities would severely impact the lifestyle of Yakutat.

Cumulative Effects: The additive effect of this alternative and other OCS sales and activities should be no different from and the same as that for the proposal.

Unavoidable Adverse Effects: If enclave development is adequately implemented by all concerned parties, then the unavoidable adverse effects on the lifestyle of Yakutat would have been moderated. If the full enclave is not enforced during the OCS development phase, a partial enclave case would ensue with a number of adverse effects on the Yakutat lifestyle.

* Impacts on the Local Economy of Yakutat: Deletion of all or part of the nearshore area, with a pipeline to Yakutat, in Alternative IV will create economic effects similar to those in the proposal. This is because deletion of the nearshore tracts does not seem to affect the resources and development

* Issue of Significant Concern

invloved. Again, local tax revenues will rise rapidly while economic conditions will range between mild to moderate stimulous in the more likely full enclave guided development case and boom conditions with some dislocation in the partially enclaved case.

Conclusion: Economic impacts would be similar to the proposal, Alternative I (sec. III.A.2.b.), and range from mild to severe depending on the degree to which employment is enclaved and impact-controlled.

Cumulative Effects: The cumulative or interactive impacts of local developments have been considered in the alternative and its conclusion above. In addition to these local cumulative or interactive impacts, there are interactions with major non-local developments to be considered. In general, however, interactions with major non-local development do not seem likely. For example, sale 39 offers no development potential and OCS sales 46, 60, and CI are too far away. Tankering of Beaufort Sea, Prudhoe Bay, Pacific LNG, and Alpetco resources seem unlikely to interact with the Yakutat economy except possibly in the commercial fishing area. Thus, no cumulative economic effects outside of those discussed in the locale of this alternative are foreseen.

Unavoidable Adverse Effects: Unavoidable adverse effects of this alternative are, as in the proposal, limited to mild to moderate stimulus because available information indicates that the local government probably can and will enclave most petroleum employment and also achieve agreement concerning limits to disruptive purchasing and hiring by the petroleum sector.

* Impacts on Cultural Resources: The following discussions regarding potential impacts to cultural resources assume that the proposed committed mitigating measure (sec. I.B.1.b., Stipulation for Protection of Cultural Resources) would be in effect.

Terrestrial Archaeologic and Historic Sites: Direct adverse impacts to terrestrial sites could occur as a result of various construction activities normally conducted on the adjacent coastal areas. Such impacts anticipated to result from this alternative are the same as those discussed in sec. III.A.2.b., Impacts on Cultural Resources.

Impacts to archaeologic and historic sites located on the coastal areas could be directly affected by oilspills. The direct oil contamination of cultural materials could render them unrecognizable, or significantly reduce the amount of scientific information obtainable.

The oilspill risk analysis (sec. III.A.1.d.) indicates that in the event of an oilspill the coastal area from Phipps Peninsula to Dry Bay would have a relatively high probability (44 percent) of being oiled. This portion of the coast also coincides with the highest concentration of known sites. Although most of these sites are above normal wave action, it is possible that some sites could be damaged or destroyed by direct oiling. The presence of oil adjacent to a site would also cause detrimental effects, although such impacts are regarded as being less severe. The probability of spilled oil impacting other portions of the coast is relatively low (7 percent or less), and there is a zero percent chance of either a direct or indirect impact on a National Register property resulting from spilled oil.

* Issue of Significant Concern

Indirect impacts resulting from salvage archaeology and the accessioning of artifacts would be the same as those discussed in sec. III.A.2.b.

A positive effect of this alternative on cultural resources could occur as a result of historic and archaeologic surveys. The investigation and systematic collection of specimens could increase the knowledge of historic and prehistoric cultures of the region.

Known and Potential Submerged Archaeologic and Historic Sites: Impacts to known shipwrecks anticipated to result from this alternative are the same as those discussed in sec. III.A.2.b.

Based on the evaluation of offshore site probabilities (sec. II.C.3.), remote sensing surveys would not be required. This is due to the deletion of the nearshore blocks which were indicated as exhibiting a high probability of site occurrence. The deletion of these blocks significantly reduces the potential adverse effects on potential sites.

Sites which may occur in blocks could be adversely affected by the placement of offshore platforms, pipelines, and related facilities.

Further impacts could occur due to increased sedimentation resulting from such activities. Such sedimentation could substantially increase cover over cultural materials, and thus, significantly reduce detection by remote sensing equipment.

The increased activity resulting from the proposed action could indirectly affect cultural sites adjacent to construction sites. Such impacts could result from the mooring of support and supply vessels, as well as the lightering of materials to shore by barge.

Conclusion: Development resulting from Alternative IV could cause both significant direct and indirect adverse effects on terrestrial archaeologic and historic sites. Direct impacts to cultural sites could result from off-lease construction activities, and oil contamination of site materials. Indirect impacts could result from the siting of oil- and gas-related facilities adjacent to cultural sites, oiling of the cultural environment, and through the processes of salvage archaeology.

Significant adverse effects on potential submerged archaeologic sites could affect those which are unidentifed. Although unlikely, potential sites could be affected by the siting of offshore facilities, an increase in siltation from construction activities, as well as an increase in marine traffic. A beneficial effect of this alternative could result from site surveys and the systematic collection of cultural specimens.

Cumulative Effects: The increase and/or addition of activities within the area could further jeopardize archaeologic and historic sites. Lack of site information in the area substantially increases the potential of adverse impacts to cultural resources. The continued use of predictive modeling and the systematic collection of cultural remains conducted prior to future developments could advance scientific knowledge of past cultures.

Unavoidable Adverse Effects: Onshore archaeological sites or artifacts may not be detected with total certainty by surveys. Those which remain undiscovered would be damaged or destroyed, partially or wholly, if construction occurs. When an archaeological site must be excavated because no other site option exists, some values which might accrue to a future investigator due to greater knowledge and more sophisticated analytical techniques and equipment, are permanently lost. The incidence of damage on the continental shelf is likely to be low, but is potentially higher in the coastal zone. However, as site materials found on the outer continental shelf would probably be of considerable antiquity, the scientific value of the loss of such materials could have a significant effect.

Other damage to archaeological resources could come from oil contamination. The probability of such a pollution event occurring and interacting with artifacts is low and the potential for significant resource destruction appears small, although it does exist.

Impacts on Visual Resources: The deletion of the nearshore tracts, as called for in Alternative IV, would lower the visual impact of offshore platforms because it would remove from the proposed sale all tracts which could be perceived by a shoreline observer.

Conclusion: There would be a moderate reduction of visual resource impacts, as compared to the proposed action, because of the nearshore tract deletions.

Cumulative Effects: The cumulative effect on visual resources in the Yakutat coastal area would be moderately reduced because of the nearshore tract deletions over the life of the proposed project.

Unavoidable Adverse Effects: The unavoidable adverse effect of the proposal on the visual resources of the Yakutat coastal area would be severe because of the long-term degradation of the visual quality of undeveloped coastal areas.

Impacts on Recreation and Tourism: In this alternative, the impacts would be the same as those listed in sec. III.A.2.b., Impacts on Recreation and Tourism under the proposal.

Conclusion: OCS development would probably have only short-term adverse impacts on the area's recreational use. These adverse impacts would be related to construction activities and would cease upon its completion.

Cumulative Effects: Cumulative impacts on recreation and tourism in the Yakutat area would not be significant, assuming an enclave style of development.

Unavoidable Adverse Effects: There would be no unavoidable adverse effects on recreation and tourism in the Yakutat area, assuming an enclave style of development.

Impacts on Wilderness Resources: Impacts perceived under this scenario would be largely those expressed in sec. III.A.2.b., Alternative I, proceed with proposed lease sale.

Conclusion: OCS development under this scenario would have only a minor impact on wilderness values. For additional impacts, refer to the preceding sections on visual resources as well as recreation and tourism.

Cumulative Effects: Wilderness resources would not suffer substantial cumulative effects, except in the case of visual diminution (refer to the preceding discussion on visual resources).

Unavoidable Adverse Effects: This alternative would not be at odds with current Forest Service land use plans. It would also represent the intrusion of man on a permanent basis into an area in which he has previously been a transient, but only in close proximity to the city of Yakutat.

Impacts on Land Use: Alternative IV is a modification of the proposed action. It is similar in every respect to the proposed action, except that several nearshore tracts have been deleted. There would be an oil terminal and a support/supply facility at Yakutat, and 50 mi of pipeline, 40 of which would be offshore (table III.A.2.b.-2). The options for the fate of associated gas are the same as those for the proposal. For further discussion, refer to sec. III.A.2.b., Impacts on Land Use.

Conclusion: The impact of onshore facilities development, pipeline construction, terminal facilities, and a potential LNG plant on local land use in Yakutat would be moderate to severe, and similar to land use impacts discussed under the proposal.

Cumulative Effects: The cumulative effect of this alternative in addition to the effects of sale 39, expanded commercial fishing facilities in Yakutat, LNG construction, and any other non-oil and gas projects in the local area would have a moderate to severe long-term cumulative effect on land use in Yakutat.

Unavoidable Adverse Effects: The primary unavoidable adverse effect of this alternative on land use is a potential loss of habitat or land area important to local wildlife populations, changes in drainage patterns, recreational uses, and aesthetic uses.

c. Impacts on Coastal Zone Management: The city of Yakutat is proposing to expand its Coastal Management planning to include territory in the unorganized borough from Cape St. Elias to Dry Bay. The State Office of Coastal Management (OCM) has requested deletion of the nearshore acreage which is part of Alternative IV. This deletion, according to OCM, would grant additional protection to the territorial waters and coastal zone area under consideration of the expanded coastal management planning effort.

Conclusion: Alternative IV would be beneficial to expanded coastal management planning effort proposed for territory in the unorganized borough portion of the coastal zone. Alternative IV would have no adverse impact on the approved Alaska Coastal Management Program.

Cumulative Effects: Alternative IV would not contribute any additional impacts on the Alaska Coastal Zone Management Plan.

Unavoidable Adverse Effects: Alternative IV would have no unavoidable adverse effect on Alaska's Coastal Zone Management Plan.

d. * Impacts on Water Quality: Under Alternative IV, the impacts on water quality as previously described in the Final Environmental Impact Statement for sale 39 would apply primarily to the proposed lease area, Yakutat, and surrounding coastal waters. Also, refer to the discussion on water quality in section II.

Conclusion: Although Alternative IV proposes to delete some of the nearshore tracts, water quality in Yakutat would still be impacted to some degree.

During petroleum development, the water quality in the Gulf of Alaska would be altered and degraded to some degree. Presently, a near pristine environment exists in the Gulf of Alaska. Offshore, petroleum development, excluding a major oilspill, would result in localized degradation of the water quality in the vicinity of any permanent structure. A major oilspill reaching the coastline would have temporary, if not permanent, effects upon the water quality (through the mechanisms of being incorporated within the bottom sediments).

In the proposed lease area, time would be an essential factor in allowing the diffusion and dispersal of a major oilspill before possible contact with the coastline. To date, open water containment techniques are inadequate to control any major oilspill.

The major impact on water quality could occur within the confines adjacent to onshore petroleum activities.

Cumulative Effects: Under Alternative IV, Deletion of Nearshore Tracts, cumulative effects upon water quality in the Gulf of Alaska would be comparable to the proposal, Alternative I. There is no means of differentiating cumulative water quality effects between the proposal and Alternative IV. Refer to sec. III.A.2.d. for a discussion of cumulative water quality effects under the proposal.

Unavoidable Adverse Effects: Despite the nearshore tract deletions under Alternative IV, formation water introduced into the water column would contribute to the deterioration of water quality by the addition of entrained liquid hydrocarbons, dissolved mineral salts, and the absence of dissolved oxygen. Pipeline construction and drilling operations would disturb bottom sediments and result in a temporary decrease in visibility. Onshore construction of a marine terminal and port facilities would result in adverse water quality. Drilling effluents containing caustic soda, fenochrome hydrosulfonate, and barium would cause water quality deterioration if introduced into the water column. A general contamination of confined areas adjacent to onshore petroleum storage and production facilities might be expected from chronic, low-level pollution. Extremely low to severe water quality degradation can result from an oilspill depending upon its trajectory and possible shoreline impact.

* Issue of Significant Concern

e. * Impacts on Air Quality: Under Alternative IV, the same types of impacts on air quality as previously described in the Final Environmental Impact Statement for sale 39 would apply primarily to the proposed lease area, Yakutat, and surrounding coastal areas. Also, refer to section II for additional material on air quality. The DOI has published new air quality regulations under 30 CFR Part 250.57 to implement Section 5 (a) (8) of the OCS Lands Acts Amendments of 1978. These regulations become effective June 2, 1980 and would substantially prevent or mitigate any potential air quality impacts from petroleum development.

Conclusion: Under Alternative IV, the proposed lease area is enveloped by a high energy environment. Due to the distance from shore and the high rate of diffusion and dispersal of contaminants, little impact on the air in the communities and adjacent coastline is believed probable.

Cumulative Effects: Despite the deletion of some of the nearshore tracts, the cumulative effects upon air quality could result from shore based refineries. If emission controls are installed and function properly at point sources, harmful emissions should not be significant. A major reduction in air quality could result from malfunctioning emission controls at point sources. The reductions would be temporary. The amount of air pollution resulting from additional concentrations of people and vehicles could be significant. Refer to sec. III.A.2.e. for a discussion of similar air quality effects in the Gulf of Alaska from other emission sources. Other OCS sales would not cumulatively affect air quality in Yakutat.

Unavoidable Adverse Effects: Unavoidable adverse effects on air quality could result from degradation of air quality during and subsequent to platform fires, loading and unloading of oil tankers in Yakutat, and any potential LNG operations. However, it is unlikely such adverse effects would occur due to air quality regulations controlling emissions from such activities.

* Issue of Significant Concern

6. Alternative V - Modify the Sale by Deletion of the Nearshore and Northwest Portions: This alternative proposes to delete parts of the nearshore and northwestern offshore portions of the proposed lease area as previously described in sec. I.

The following describes the more significant impacts which are anticipated to occur under the effects of the tract deletions contained in Alternative V. Impacts which might occur as a result of either the proposed or optional scenario have been previously discussed under Impacts of the Proposal.

Figure III.A.6.-1 shows the proposed tract deletions. This figure also shows the percent chance of a hypothetical oilspill impacting various points along the shoreline. These results were derived from the USGS oilspill trajectory analysis (USGS Open File Report No. 79-1784). The 3, 10, and 30 probabilities of impact on the shoreline indicate the percent chances of a hypothetical spill hitting the beaches after 3 days, 10 days, and 30 days of drifting at sea.

For crude oil, most of the toxic effects of the volatile fractions have usually dissipated 10 days after a spill. This figure, summarizing oilspill impact probabilities on the shoreline, provides a ready reference for use with the discussions of the various ecological and lifestyle impacts that follow.

a. Impacts on the Biological Characteristics of the Affected Environment:

Impacts on Marine Habitats and Food Web Resources: The additional deletion of tracts in the offshore area under this alternative would further reduce any potential direct or indirect impacts on the benthos or food web resources throughout the water column. Unfortunately, this potetial lessening of impact on benthic habitat is not quantifiable.

The nearshore tract deletions offered under this alternative would similarly reduce the potential affects on coastal habitat impacts due either to disturbance activities by man and OCS activities or from potential platform spills which would be a bit further offshore.

Conclusion: Alternative V would neither significantly affect nearshore coastal habitats along the Yakutat-Icy Bay coast nor pelagic habitat offshore.

Cumulative Effects: The cumulative impacts over the life of the field on the pelagic habitat should be no worse than the described impacts during any year of operation because of the steady rate of exchange of organisms in the pelagic habitat.

The cumulative impacts from other OCS lease sales, increased tanker traffic, timber activities, and d-2 legislation should not significantly affect the offshore benthic organisms.

Unavoidable Adverse Effects: There are no significant unavoidable adverse effects on either nearshore coastal habitats or pelagic habitats anticipated under this alternative.

Impacts on Fish Resources: Alternative V would additionally reduce impacts on fish resources over the other 2 alternatives. There is some 3-27 percent reduction of impacts that would occur to bottomfish spawning areas by deleting the eastern blocks as proposed in the alternative.

Conclusion: Alternative V would reasonably reduce estimated impacts on fish resources of the area.

Cumulative Effects: There would be some slight reduction of cumulative impacts primarily caused by the interaction of this alternative and the other ongoing or probable oil, gas, and refined product production and shipping areas in the Gulf of Alaska, on bottomfish species if this alternative is selected.

Unavoidable Adverse Effects: The effects of a major spill on nearshore fish populations, although unlikely, could be serious. This alternative tends to help reduce this potential adverse effect.

* Impacts on Commercial Fisheries: The additional tract deletions offered under this alternative substantially aids in the reduction of potential impacts of either a disturbance or spill nature on commercial fisheries in the offshore and coastal waters.

Conclusion: Alternative V could increase impacts on bottomfisheries. It would not reduce impacts of shoreside competition and may increase impacts on fishing gear. Yakutat-based and offshore fishermen alike would be affected.

Cumulative Effects: Cumulative impacts would remain about the same. However, a spill from another source such as the oil, gas, and refined product shipments from Valdez would have greater adverse effects, because there is the possibility of the addition of some pollutants due to chronic, low level pollution. These effects cannot be quantified at this time.

Unavoidable Adverse Effects: This alternative would tend to decrease the chronic pollution effects in the open ocean because of the offshore tract deletions.

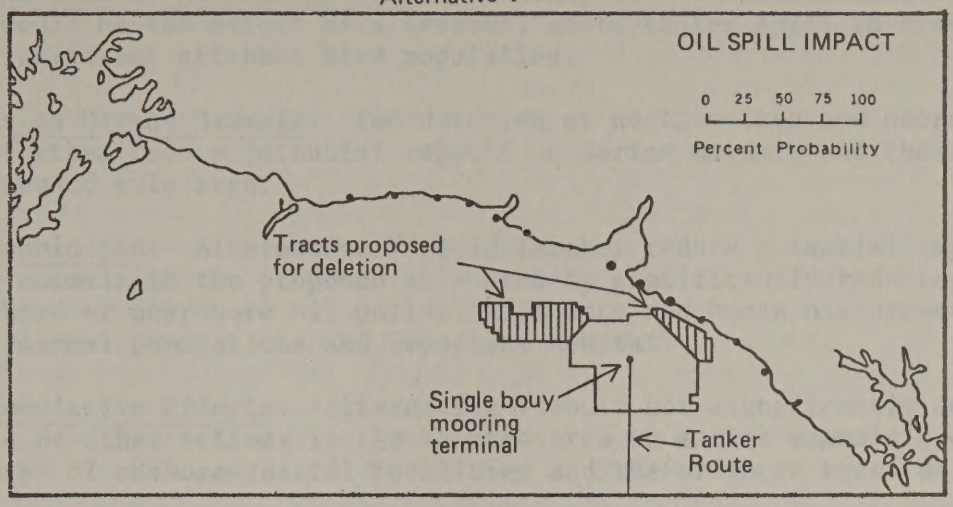
Impacts on Birds: The deletion of the northwestern as well as the nearshore tracts would decrease the potential impacts on marine birds and waterfowl, especially on marine birds which forage in the offshore tract areas. The reduction of offshore tracts may also reduce the number of bird-platform collisions along migration routes.

Conclusion: The deletion of the northwestern tracts, as well as the nearshore tracts, would decrease potential impacts on marine and migratory birds, especially in offshore foraging areas and along offshore migration routes.

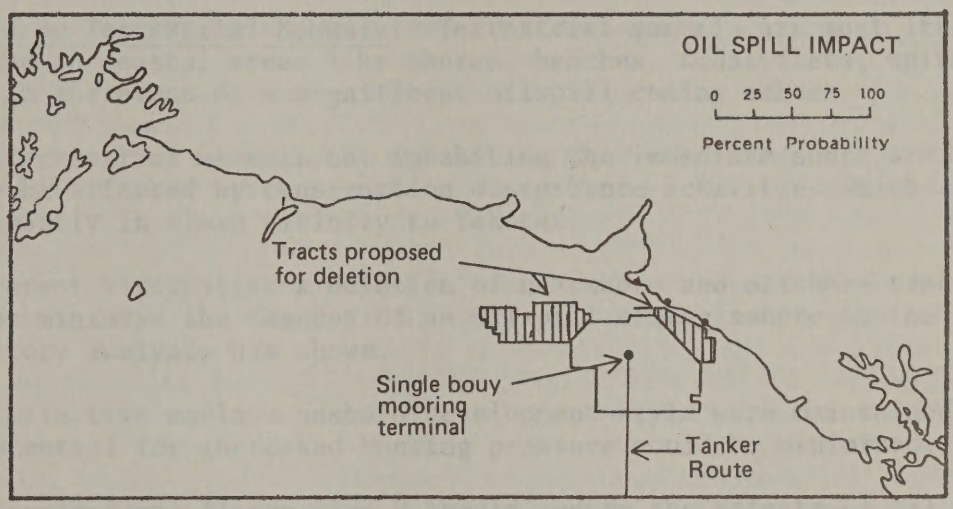
Cumulative Effects: Alternative V and other OCS sales, plus Valdez tanker traffic, would not significantly add to the effects on birds in the Yakutat-Icy Bay area.

* Issue of Significant Concern

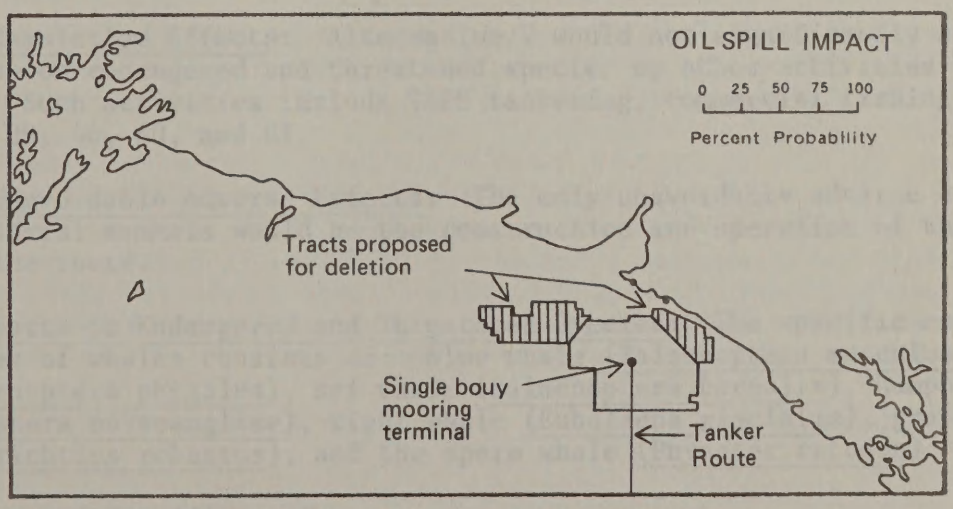
Figure III. A.6 . – 1
Alternative V



DAY 30 PROBABILITY OF 1 OR MORE SPILLS

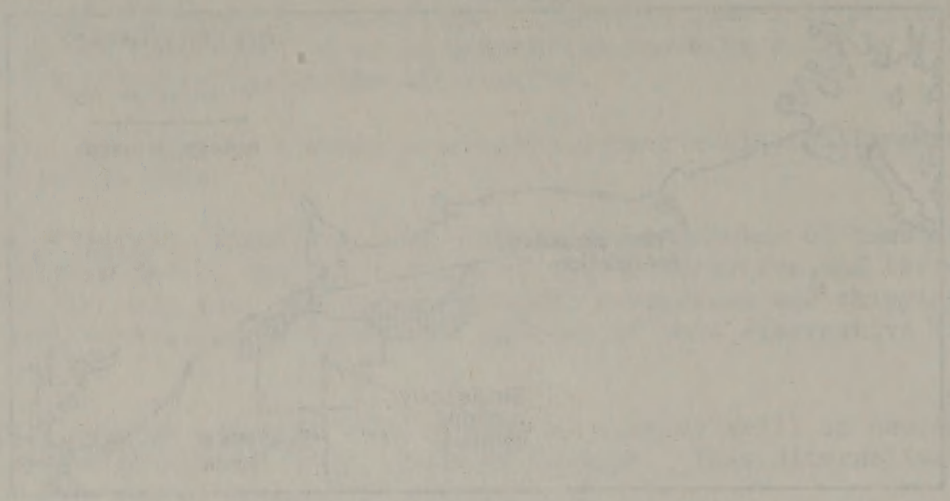


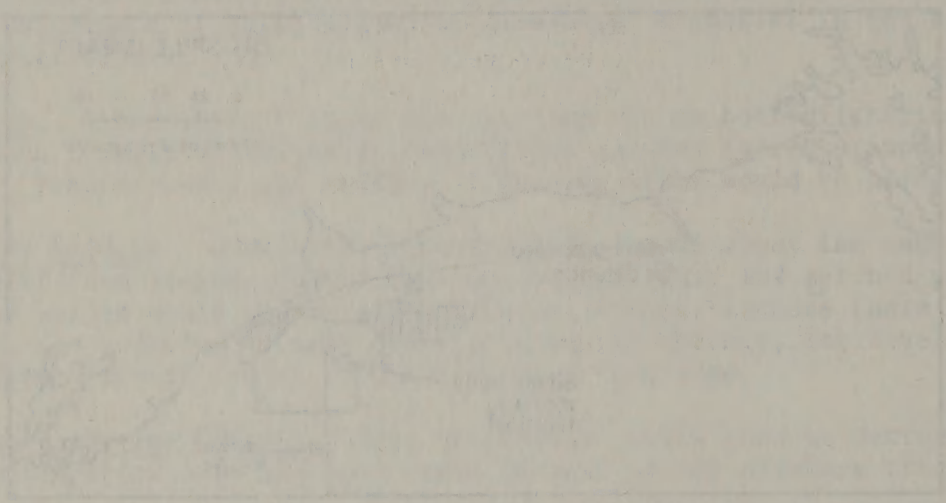
DAY 10 PROBABILITY OF 1 OR MORE SPILLS

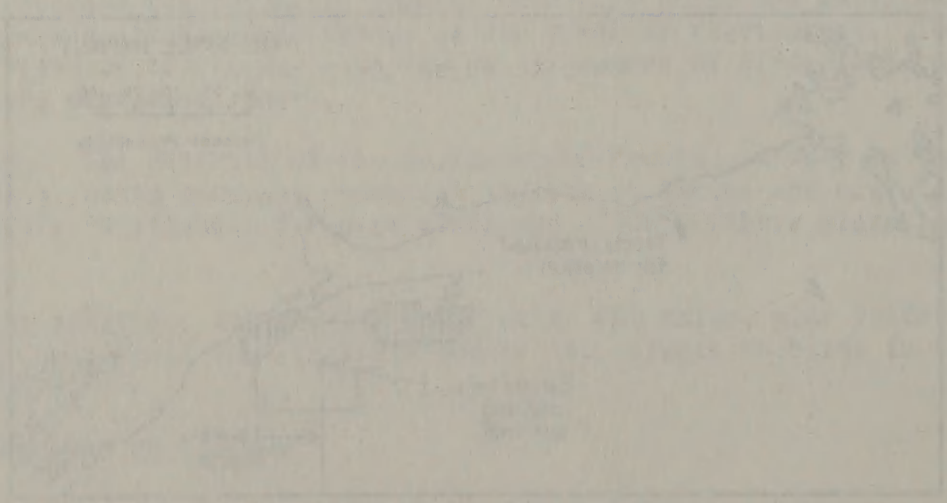


DAY 3 PROBABILITY OF 1 OR MORE SPILLS

Source: USGS Open File Report No. 79-1784, 1979







Unavoidable Adverse Effects: The only unavoidable adverse effect on birds would be the effect of a serious, acute tanker spill in close proximity to a significant offshore bird population.

Impacts on Marine Mammals: The deletion of northwestern and nearshore tracts would further reduce potential impacts on marine mammals and their habitats in the proposed sale area.

Conclusion: Alternative V would further reduce potential impacts on marine mammals in the proposed sale area by significantly reducing the chances of onshore or nearshore oil pollution impacts and human disturbances of large marine mammal populations and important habitat.

Cumulative Effects: Alternative V would not significantly add to the effects of other actions in the Yakutat area on marine mammals because of the reduction of onshore coastal facilities and the offshore tract deletions.

Unavoidable Adverse Effects: There would be very little unavoidable adverse effects on marine mammals under this alternative.

Impacts on Terrestrial Mammals: Terrestrial mammals are most likely to be affected in coastal areas like shores, beaches, tidal flats, spits, and island areas in the event of a significant oilspill coming ashore.

Those terrestrial mammals not inhabiting the immediate shore area would more likely be affected by construction disturbance activities which are expected to be mostly in close vicinity to Yakutat.

The present alternative's deletion of nearshore and offshore tracts would further minimize the chances of an oilspill coming ashore as the oilspill trajectory analysis has shown.

If an effective enclave onshore development style were maintained, then even the potential for increased hunting pressure could be minimized.

Conclusion: Alternative V should reduce the affects of oil and gas activities on terrestrial mammals in the proposed sale area more than under the proposal or the other alternatives.

Cumulative Effects: Alternative V would not significantly add to the effects on endangered and threatened species by other activities in the Yakutat area. Such activities include TAPS tankering, commercial fishing, and OCS sales 39, 46, 60, and CI.

Unavoidable Adverse Effects: The only unavoidable adverse effect on terrestrial mammals would be the construction and operation of the Alsek River pipeline route.

* Impacts on Endangered and Threatened Species: The specific endangered species of whales consists of: blue whale (Balaenoptera musculus), fin whale (Balaenoptera physalus), sei whale (Balaenoptera borealis), humpback whale (Megaptera novaeangliae), right whale (Eubalaena glacialis), gray whale (Eschrichtius robustus), and the sperm whale (Physeter catodon).

* Issue of Significant Concern

The deletion of the northwestern tracts and nearshore tracts under this alternative may reduce the amount of oil and gas offshore activity that could have an affect on endangered migratory whales and their food sources.

Conclusion: Alternative V reduces the amount of offshore drilling that could affect endangered whales.

Cumulative Effects: Alternative V would not significantly add to the effects on endangered and threatened species by other activities in the Yakutat area. Such activities include TAPS tankering, commercial fishing, and OCS sales 39, 46, 60, and CI.

Unavoidable Adverse Effects: The most significant unavoidable adverse effect on endangered whales would be their migratory passage through a major oilspill either in the proposed lease area under this alternative. It is not anticipated that any adverse effects on endangered birds would occur because of this alternative with its additional tract deletions.

b. Impacts on the Affected Social and Economic Environment:

* Impacts on the Lifestyle of Yakutat: A majority of the workers would be based on the offshore marine loading terminal. Approximately 80 workers would be based in Yakutat in 1981, rising to approximately 200 workers in 1987, and then dropping to approximately 40-50 workers in 1988 and throughout the life of the field. The marine service base, built for the 1976-77 exploration activity should have sufficient capacity, with minimal additions, to house the workers based in Yakutat.

The Yakutat airport would receive the brunt of the impacts on Yakutat as all workers would enter and leave the region through the airport. Subsistence activities would decrease to some extent as Yakutat residents engage in oil and gas employment and as subsistence animals move away from the exploration, development, and production activities. The present character of Yakutat would change to some degree with the activities; however, gross changes would not occur with the offshore marine loading terminal.

Conclusion: The effect of Alternative V and the enclave assumption would be to significantly moderate impacts on the lifestyle of Yakutat.

Cumulative Effects: The additive effect of this alternative with other activities cited in the cumulative effects of the proposal would undoubtedly result in a low to moderate impact on the lifestyle of Yakutat over the proposed life of the project.

Unavoidable Adverse Effects: If this alternative and enclave development were adequately implemented by all concerned parties, then the unavoidable adverse effects on the lifestyle of Yakutat would be low to moderate. With the bulk of workers offshore in this alternative, partial enclave conditions would be moderate to severe depending on previous city planning efforts and the implementation of local land use planning decisions.

* Issue of Significant Concern

* Impacts on the Local Economy of Yakutat: For Alternative V where several deletions are made and an offshore loading terminal is used instead of the Yakutat oil terminal, the results are somewhat similar to those described in Alternative IV (III.A.6.). In particular the movement of the fully enclaved case in port to an offshore enclave has no effect. The partially enclaved case is going to largely disappear as an option as operations people would go for the most part to Anchorage or Seattle. Thus, the economic effect is likely to be similar to the full enclave case in the proposal where only mild to moderate stimulus and slight dislocation occurs. A difference is that the service base workers in this alternative would be nonenclave and stimulative while the local government would suffer a depressing loss of oil terminal tax revenues. Perhaps these two effects would cancel, yielding, something like the full enclave case in the proposal.

Conclusion: Economic effects of this alternatives are likely to be similar to the full enclave varient of the proposal and would be mild to moderately stimulative with little dislocation. The main difference is a large loss in local tax revenue and the introductin of nonenclaved service base workers.

Cumulative Effects: The cumulative or interactive impacts of local developments have been considered in the alternative and its conclusion above. In addition to these local cumulative or interactive impacts, there are interactions with major non-local developments to be considered. In general, however, interactions with major non-local development do not seem likely. For example, sale 39 offers no development potential and OCS sales 46, 60, and CI are too far away. Tankering of Beaufort Sea, Prudhoe Bay, Pacific LNG, and Alpetco resources seem unlikely to interact with the Yakutat economy except possibly in the commercial fishing area. Thus, no cumulative economic effects outside of those discussed in the locale of this alternative are foreseen.

Unavoidable Adverse Effects: No unavoidable adverse effects are expected from this proposal because impacts are likely to be mild to moderate.

* Impacts on Cultural Resources: The following discussions regarding potential impacts to cultural resources assume that the proposed committed mitigating measure (sec. I.B.1.b., Stipulation for Protection of Cultural Resources) would be in effect.

Terrestrial Archaeologic and Historic Sites: Direct adverse impacts to terrestrial sites could occur as a result of the expansion of the support/supply base in Yakutat. The characteristics of such impacts are discussed in sec. III.A.2.b., Impacts on Cultural Resources. It is anticipated that the overall impacts to terrestrial sites would be considerably less than those resulting from the proposal due to the limited development of onshore facilities.

Impacts to archaeologic and historic sites located on the coastal areas could be directly affected by oilspills. The direct oil contamination of cultural materials could render them unrecognizable, or significantly reduce the amount of scientific information obtainable.

* Issue of Significant Concern

The oilspill risk analysis (sec. III.A.1.d.) indicates that in the event of an oilspill the coastal area from Phipps Peninsula to Dry Bay would have a low probability (11 percent) of being oiled. This portion of the coast also coincides with the highest concentration of known sites. Although most of these sites are above normal wave action, it is possible that some sites could be damaged or destroyed by direct oiling. The presence of oil adjacent to a site would also cause detrimental effects, although such impacts are regarded as being less severe. The probability of spilled oil impacting other portions of the coast is relatively low (2 percent or less), and there is a zero percent chance of either a direct or indirect impact on a National Register property resulting from spilled oil. Due to this very low probability, the potential for impacts on cultural sites along the coastal zone is regarded as being insignificant.

Indirect impacts resulting from salvage archaeology and the accessioning of artifacts would be the same as those discussed in sec. III.A.2.b.

A positive effect of this alternative on cultural resources could occur as a result of historic and archaeologic surveys. The investigation and systematic collection of specimens could increase the knowledge of historic and prehistoric cultures of the region.

Known and Potential Submerged Archaeologic and Historic Sites: Impacts to known shipwrecks anticipated to result from this alternative are the same as those discussed in sec. III.A.2.b.

Based on the evaluation of offshore site probabilities (sec. II.C.3.), remote sensing surveys would not be required. This is due to the deletion of the nearshore blocks which were indicated as exhibiting a high probability of site occurrence. The deletion of these blocks significantly reduces the potential adverse affects on potential sites. The adverse effects which could result from this alternative are discussed in sec. III.A.5.b., although the probability of such impacts occurring are considerably less.

The increased activity resulting from the proposed action could indirectly affect cultural sites adjacent to construction sites. Such impacts could result from the mooring of support and supply vessels, as well as the lightering of materials to shore by barge.

Direct impacts to cultural sites could result from off-lease construction activities, and oil contamination of site materials. Indirect impacts could result from the siting of oil- and gas-related facilities adjacent to cultural sites, oiling of the cultural environment, and through the processes of salvage archaeology.

Significant adverse effects on potential submerged archaeologic sites could affect those which are unidentified. Although unlikely, potential sites could be affected by the siting of offshore facilities, an increase in siltation from construction activities as well as an increase in marine traffic. A beneficial effect of this alternative could result from site surveys and the systematic collection of cultural specimens.

Conclusion: Development resulting from this alternative could cause both significant direct and indirect adverse effects on terrestrial archaeologic and historic sites.

Cumulative Effects: The increase and/or addition of activities within the area could further jeopardize archaeologic and historic sites. Lack of site information in the area substantially increases the potential of adverse impacts to cultural resources.

The continued use of predictive modeling and the systematic collection of cultural remains conducted prior to future development could advance scientific knowledge of past cultures.

Unavoidable Adverse Effects: Onshore archaeological sites or artifacts may not be detected with total certainty by surveys. Those which remain undiscovered would be damaged or destroyed, partially or wholly, if construction occurs. When an archaeological site must be excavated because no other site option exists, some values which might accrue to a future investigator due to greater knowledge and more sophisticated analytical techniques and equipment, are permanently lost. The incidence of damage on the continental shelf is likely to be low, but is potentially higher in the coastal zone. However, as site materials found on the outer continental shelf would probably be of considerable antiquity, the scientific value of the loss of such materials could have a significant effect.

Other damage to archaeological resources could come from oil contamination. The probability of such a pollution event occurring and interacting with artifacts is low and the potential for significant resource destruction appears small, although it does exist.

Impacts on Visual Resources: The adoption of this alternative would remove the visual impact of offshore development from the Yakutat Forelands, and greatly lessen the visual effects of OCS activities within the township.

Conclusion: This alternative renders the least adverse visual impact.

Cumulative Effects: The cumulative effects on visual resources would be substantially less than the proposal and other alternatives because of the tract deletions.

Unavoidable Adverse Effects: There would be no substantial unavoidable adverse effects on visual resources in the Yakutat area.

Impacts on Recreation and Tourism: Under this alternative, impacts would be the same as those described under the proposal.

Conclusion: Of the alternatives offered, this option affords the least adverse impact to the recreational environment.

Cumulative Effects: Cumulative impacts on recreation and tourism in the Yakutat area would not be significant, assuming an enclave style of development.

Unavoidable Adverse Effects: There would be no unavoidable adverse effects on recreation and tourism in the Yakutat area, assuming an enclave style of development.

Impacts on Wilderness Resources: Under this alternative, impacts would be the same as those described under the proposal.

Conclusion: There would only be minor impacts to wilderness values under this alternative.

Cumulative Effects: Under this alternative, wilderness resources would not suffer any cumulative effects of other OCS sales or Valdez tanker traffic in addition to this alternative.

Unavoidable Adverse Effects: There would be no unavoidable adverse effects on wilderness resources in the Yakutat area.

Impacts on Land Use: Alternative V is a modification of the proposed action. The nearshore tracts, as well as the west end of the proposed lease area, have been deleted. The fate of associated gas would be the same as those in the proposal. For further discussion of impacts on land use, see sec. III.A.2.b.

Conclusion: Impacts on land use in Yakutat would be minor under this alternative.

Cumulative Effects: The cumulative effect of Alternative V, in addition to potential development of sale 39, expanded onshore commercial fishing facilities in Yakutat, and a potential LNG plant would have a moderate to severe long-term cumulative effect on land use in close proximity to the city of Yakutat.

Unavoidable Adverse Effects: Unavoidable adverse effects on land use in Yakutat would be minor to moderate.

c. Impacts on Coastal Zone Management: The types of impacts this alternative would have on the state's CZM plan are essentially the same as those described under Alternative I, the proposal. Under this alternative, the issuance of Federal licenses and permits, and the granting of Federal financial assistance, would probably have to be consistent with the policies and regulations of the state's Coastal Zone Management Plan.

Conclusion: Alternative V would probably have no impact on the Alaska Coastal Zone Management Plan. The Alaska CZM Plan, however, may significantly affect this alternative through the consistency provisions of CZM laws and regulations.

Cumulative Effects: Alternative V would not contribute any additional input on the Alaska Coastal Zone Management Plan.

Unavoidable Adverse Effects: Alternative V would have no unavoidable adverse effect on the Alaska Coastal Zone Management Plan.

d. * Impacts on Water Quality: Under this alternative, the same types of impacts on water quality that would pertain primarily to the offshore, as previously described in the Final Environmental Impact Statement for sale 39, would apply to the proposed lease area with an offshore marine loading terminal. Impacts on water quality in Yakutat would be substantially reduced because of the use of an offshore marine loading terminal.

During petroleum development, the water quality in the Gulf of Alaska would be altered and degraded to some degree. Presently, a near pristine environment exists in the Gulf of Alaska. Offshore, petroleum development, excluding a major oilspill, would result in localized degradation of the water quality in the vicinity of any permanent structure. A major oilspill reaching the coastline would have temporary, if not permanent, effects upon the water quality (through the mechanisms of being incorporated within the bottom sediments).

In the proposed lease area, time would be an essential factor in allowing the diffusion and dispersal of a major oilspill before possible contact with the coastline. To date, open water containment techniques are inadequate to control any major oilspill.

Conclusion: Under this alternative, water quality impacts would be further reduced because of the additional tract deletions.

Cumulative Effects: The cumulative impacts upon water quality in the Gulf of Alaska under Alternative V would be comparable to the proposal. Refer to sec. III.A.2.d. for a discussion of cumulative water quality effects under the proposal.

Unavoidable Adverse Effects: Under this alternative, any unavoidable adverse effects on water quality would occur in the offshore lease area because of the tract deletions offered.

Formation water introduced into the water column would contribute to the deterioration of water quality by the addition of entrained liquid hydrocarbons, dissolved mineral salts, and the absence of dissolved oxygen. Pipeline construction and drilling operations would disturb bottom sediments and result in a temporary decrease in visibility. Drilling effluents containing caustic soda, fenochrome hydrosulfonate, and barium would cause water quality deterioration if introduced into the water column. Extremely low to severe water quality degradation can result from an oilspill, depending upon its trajectory and possible shoreline impact.

e. * Impacts on Air Quality: Under this alternative, the same types of impacts on air quality as previously described in the Final Environmental Impact Statement for sale 39 would apply. In addition, the description of air quality emissions in section II provides a baseline of what could occur.

Conclusion: Under this alternative, there would not be any degradation of air quality in Yakutat.

* Issue of Significant Concern

Cumulative Effects: There would be no cumulative effects on air quality in Yakutat because of the tract deletions. Refer to sec. III.A.2.e. for a discussion of similar air quality effects in the Gulf of Alaska from other emission sources and to the discussion in section II. Other OCS sales and Valdez tanker traffic would not create any additive long-term effects on air quality either in the city of Yakutat or in the proposed lease area.

Unavoidable Adverse Effects: Under this alternative, there would be no unavoidable adverse effects on air quality in Yakutat, unless an LNG plant were constructed in Yakutat.

B. Relationship Between Local Short-term Uses and Maintenance and Enhancement of Long-term Productivity

In this section, the short-term effects and uses of various components of the environment of the eastern Gulf of Alaska are related to long-term effects and the maintenance and enhancement of long-term productivity. The effects of the proposed action would vary in kind, intensity, and duration, beginning with preparatory activities (seismic data collection and exploration drilling) of oil and gas development, and ending when natural environmental balances might be restored.

In general, "short-term" refers to the useful lifetime of the proposal, but some even "shorter term" uses and effects are considered. "Long-term" refers to that time beyond the lifetime of the proposal. The life of any oil and gas development in the eastern gulf has been estimated to be about 35 years. In other words, short-term refers to the total duration of oil and gas exploration and production, whereas long-term refers to an indefinite period beyond the termination of oil and gas production. This period would vary from one environmental component to another.

Many of the impacts discussed in sec. III are considered to be short-term (being greatest during the construction, exploration, and early production phases), which could be further reduced by the mitigating measures discussed in sec. I.

Biological productivity would be lost in the short-term on all onshore lands used in the proposed project. These areas could be returned to productivity in the long-term with proper management. Restoration may not be entirely feasible; however, the overall loss would be a minor adverse effect. The direct land requirements, as shown in the development scenario, would show in both the short-term and the long-term because of disturbance. Some species may have difficulty repopulating and could be displaced.

Short-term oil pollution and the possibility of long-term cumulative oil pollution impacts could cause serious adverse effects on all components of the marine ecosystem, including fisheries. While restoration would allow fisheries production to regain original levels, any reduced annual harvests during the life of the project would be irretrievably lost. The extent is not known presently, but the potential must be recognized.

Freshwater pollution from onshore activities is a short-term effect. The long-term decrease in water quality may be considered to be a tradeoff for obtaining oil and gas resources.

The biota would be threatened in the short-term by potential oil pollution. Direct mortality could be significant through the combined effects of harassment by humans and increased volume and frequency of noise from vessel traffic or overflying aircraft. In the long-term, such disturbances could alter behavior patterns and could drive fauna away from traditional feeding and breeding grounds or other critical areas within their range.

Endangered species with restricted feeding grounds and/or migration routes could become extinct if an environmental imbalance occurred.

Habitat destruction could cause a reduction in subsistence species, such as salmon. This could seriously threaten the regional economy. The improved accessibility to primitive areas from increased construction is a short-term result of this proposal. The overall wilderness value of the coast may decrease from increased land use. Increased human populations in the short-term could change the regional Native culture in the long-term. The subsistence way of life could be modified and population shifts could occur. The overall changes cannot be termed positive or negative, except by those affected.

Archaeologic and historic values discovered during development would enhance long-term knowledge. Overall finds may help to locate other sites, but, destruction of artifacts would represent long-term losses.

Consumption of offshore oil and gas would be a long-term use of nonrenewable resources. Economic, political, and social benefits may accrue from the availability of oil and gas. Most benefits would be short-term and would decrease the nation's dependency on oil imports. If additional supplies were discovered and developed, the proposed production system would enhance extraction.

The production of oil and gas from the eastern gulf would provide short-term, critically needed energy and perhaps provide time either for the development of long-term alternative energy sources or substitutes for petroleum feedstocks. Petroleum development in the eastern gulf may mean the irreplaceable loss of some fisheries production. The maintenance and enhancement of long-term productivity would depend on our efforts to control water quality levels. Regional planning would aid in controlling changing economics and populations, and thus in moderating any adverse impacts.

Alternatives to the proposal, such as cancellation, delay, partial deletion, and the technological options reduce to varying degrees both the long- and short-term environmental effects, as well as the long- and short-term energy supply benefits, as explained in the preceding impact sections.

C. Irreversible and Irretrievable Commitment of Resources

1. Mineral Resources: Except for potential hydrocarbon resources which, if discovered, may be produced as described in sec. I.A, there are no significant commitments required of other mineral resources in order for potential offshore oil and gas development to proceed.

The U.S. Bureau of Mines indicated during the scoping process for sale 55 that some potential exists for offshore and coastal placer deposits. However, the placement of 1 to 3 offshore production platforms would not take up enough space to inhibit the potential development of other offshore mineral resources.

2. Biological Resources: This section considers all biological impacts except those on endangered species for which consultation is not yet complete.

The small losses of commercial fishery incomes are probably irreversible and irretrievable losses. If the quantity or quality of harvested fish were reduced by oil and gas production, the lost income would not be available to fishermen during a subsequent year of operation. In this sense, the commercial fisheries, which are based on a renewable resource, are unlike the oil and gas industries which are based on a nonrenewable resource; the former is irretrievably lost (to other consumers in the ecosystem) if it is not regularly harvested, whereas the latter is available until it is removed from the ground.

Commercial fishery losses may occur in several ways as discussed above in the section on Commercial Fisheries. For example, if the nearshore areas are contaminated, salmon may avoid the areas which are also the areas in which they are harvested in gill nets. If fish tissue becomes tainted, there may be a widespread consumer avoidance of all locally harvested fish products, which would affect both fishermen and processors alike. Finally, if there is competition for harbor dock space or employees as a result of leasing, U.S. fishermen would not aggressively exploit the new U.S. offshore bottomfishery; continued harvest of this fishery by foreigners would mean irretrievably lost income to U.S. fishermen and processors.

General industry activities, such as increased ship traffic, aircraft noise, and land based activities, could displace marine and terrestrial birds and mammals into less favorable environments, eventually being reflected in a reduced population level.

This displacement could become irreversible because nuisance species could occupy and retain the vacated sites.

3. Endangered and Threatened Species: Formal consultation with the National Marine Fisheries Service has been initiated, but a biological opinion has not yet been rendered. The following assessment of irreversible commitments of endangered species has been considered and included herein.

Under the proposal and its alternatives, with the exception of the no-action alternative, migrating endangered and threatened whales could possibly be irreversibly subjected to potential adverse effects of either a major oilspill

or the unpredictable effects of noise and human disturbance in the proposed lease area.

4. Lifestyle of Yakutat: The only element actually introduced as an irreversible and irretrievable resource which could be committed is the lifestyle of Yakutat and the surrounding area. If the people of the area and industry do not coordinate and cooperate in the exploration, development, and production of the oil and gas, Yakutat would lose its close-knit, small-town, ethnically diverse, but initially sharing and accepting, tradition-laden character. The assumption of an enclave style of development as discussed in sec. I. would, if adequately implemented, minimize some of these potential irreversible effects on the lifestyle of Yakutat.

D. Impact of the Maximum Development Scenario

There is a certain degree of uncertainty attached to exploratory operations on the Outer Continental Shelf. Some of the uncertainty is due to lack of precise knowledge as to the composition and location of any oil and gas reserves that may be discovered.

The assumptions and description of the maximum development scenario can be found in Appendix A. The most important aspects of this scenario are the potential for 800 million barrels of oil, 2.5 trillion cubic feet of gas, and the construction of an LNG plant at Yakutat, although a gas pipeline through the Alsek River Valley is also an option. The following describes a worst case oilspill under maximum scenario conditions and the subsequent ecological impacts.

1. Impacts on the Biological Characteristics of the Affected Environment:

a. Sale 55, Gulf of Alaska Oilspill Analysis: During the winter in the proposed lease area, prevailing winds blow from the southeast effecting a northwest wind stress upon the sea surface. A rising sea surface directed towards the shore would result, causing a northwest flowing coastal current. Surface oil transport in the Northern Hemisphere would be directed to the right of a wind stress acting upon the sea surface by Coriolis force. (In the proposed lease area this would be in an onshore direction.)

Another consideration is the year-round occurrence of large waves impinging upon the coast. Wave refraction along the shelf break and shoreline would probably enhance shoreward transport of a surface pollutant. In evidence of these shoreward surface transportation conditions, fishermen in the area have stated that "Most of all their gear lost overboard beaches along the coast."

A spill trajectory offshore the shelf break could involve weather and current flow parameters appreciably different from those associated with a coastal trajectory. In a high-energy environment, such as those both along the coast and offshore in the proposed lease area, time might be the overriding consideration in all or most of the circumstances involving a surface spill. For example, if a pollutant was spilled a considerable distance from shore, the spill would probably be subjected to weathering and dispersion long before its impact on the shoreline. As of this date, no effective open-water containment equipment and technology exists.

b. Impacts on Fisheries, Marine Mammals, and Birds: In light of the above worst case oilspill, the most significant ecological impact would be on commercially important fish fry, particularly salmon fry, food web resources for commercial species, and any other marine mammals and birds which inhabit nearshore coastal areas and beaches. The impact on endangered species would be the same as described in sec. III.A.2.a., Impacts on Endangered and Threatened Species.

c. Impacts on Coastal Ecology: Coastal habitats and their ecological dependants are most likely to be impacted by an oil slick that will drift to shore or will occur in the nearshore area. A major oilspill will probably affect portions of 150 km of coastline near Yakutat. Portions of the

coastline will retain oil for a year or longer. It will directly kill an unpredictable number of, or indirectly affect such commercially important species as, salmon fry and shellfish.

OCS statistics for offshore oil production have shown that 1 major blowout occurs on the average for every 2,860 wells drilled. In the proposed lease area, this worst case scenario indicates that 20 exploratory wells would be drilled during the life of the field. Therefore, there is only about a 1 in 150 chance that a major blowout would occur. However, the risk of spillage associated with tankering of oil is about 30 times greater. Thus, the total risk of major oilspills is about 1 in 5 or 20 percent over the life of the field. The USGS oilspill risk analysis indicates a 31 percent chance of any oilspill reaching the shore.

2. Impacts on the Affected Social and Economic Environment:

a. Impacts on the Lifestyle of Yakutat: The range of options to determine the potential impacts of the maximum development scenario on the lifestyle of Yakutat are maintained as in the mean case (the proposal) by considering the full and partial enclave cases. The basis for the discussion is found in Technical Memorandum No. 2, Northern Gulf of Alaska Statewide and Regional Population and Economic Systems Impact Analysis, ISER. The maximum development scenario assumes larger resource amounts from the mean case and the installation of an LNG plant. The phasing of the maximum development scenario in population terms is comparable to the mean scenario (see table III.A.2.b.-1). The significant difference in population increase between this and the mean case is contributed by the LNG facility. As shown on table III.D.-1, the total OCS-related popultion during peak 1986-90 period reaches almost 1,300. Beyond this peak period, the operations phase population comprises the bulk, of OCS-related population, reaching to over 870 between 1991-1995 and to a slightly lower figure in the subsequent period.

Full Enclave Case: See the discussion of a full enclave in sec. III.A.2. The population and associated impacts on the lifestyle of Yakutat in the maximum scenario should differ more in degree than in kind from those portrayed for the mean case under full enclave assumptions. The principle exception would be the siting of the LNG facility, the increased ad valorem property tax base this would provide the city if annexed, and the size of the enclave to house OCS-related population.

During the peak of 1986-1990, the OCS-related population to be housed in enclave in Yakutat would almost equal twice the population of Yakutat projected in the non-OCS case. After the peak of 1986-1990, the enclaved operations phase population would equal the population size of Yakutat itself. Such OCS-related population gradually declines thereafter proportionate to the operational needs of the field and its onshore support facilities.

Partial Enclave Case: In the partial enclave case, the population associated with the development of the field and onshore facilities are assumed based in an industry-provided enclave, whereas the production or operations phase population is housed within the community of Yakutat. The enclaved population is not considered to contribute significantly to Yakutat's total population for residential service demands.

The non-enclaved OCS-related population in the initial 1981-1985 period is almost 170, increasing the Yakutat area population by 26 percent to slightly over 800 persons. In the subsequent period, the resident population of Yakutat is increased by 70 percent to a total of 1,271 area-wide. During this 1986-1990 period, the additional enclaved population more than equals the non-OCS case population of Yakutat. The peak period of non-enclaved population increase occurs during the 1991-1995 and 1996-2000 periods, where the non-OCS case area population is doubled by OCS resident population. This increase is almost entirely the result of LNG plant associated population during these periods. The proportion of OCS-related population to total pooulation thereafter decreases as other economic sources contribute to total population.

Using the same standards, methods, and assumptions as in the mean case. the non-enclaved, OCS-related population reduces to 55 families in the initial 1981-1985 period, as shown in table III.D.-2, reaching a peak of 282 families in 19911995. The amount of residential land needed to house these additional families, shown in table III.D.-2, increases slightly more than nine net residential acres (about 13 acres total, including residential street rights-of-way) in the initial period to about 47 net residential acres in the 1991-1995 period of peak housing demand. An additional 18.3 acres of street rights-of-ways produces a total peak period residential acreage demand of about 65 acres. The net effect during the peak housing demand period would be to increase the amount of land used residentially in Yakutat by about 1.5 times the present case.

The services required for such a large increase in Yakutat's population would severely strain the capacity of existing public facilities and services. The capital improvement program for Yakutat would require extensive overhaul to reflect the added population and the specific effects on existing facilities and services. As shown in table III.D.-3, additional daily residential demand for water would range from 21,125 gallons in 1981-1985 to 109,125 gallons at the peak 1991-1995 period. A major effect of such added water usage would be to require increased sewage and sewage treatment peak load capacity. Peak load sewage treatment requirements for the added residents would increase from twice the existing 30,000 gallon per day design capacity in 1981-1985 to eleven times such capacity at the peak of 1991-1995. Using combined enclaved and non-enclaved OCS-related population, almost 800 kilowatts (kw) of new installed electrical capacity would be required in 1981-1985, increasing to almost 4,000 kw during the following boom period and stabilizing at around a 2,500 kw requirement thereafter. The privately owned electric system in Yakutat has a peak capacity of 2,025 kw and a firm capacity of 1,225 kw to meet existing requirements. For electric, water, and sewer system purposes, it is assumed industrial onshore facilities establish self-sufficient where such demands exceed local supplies and facilities.

Additional demand can be expected to be placed as well, on other public facilities and services, including local government itself. Educational facilties and services, as shown in table III.D.-4, would have to increase to accommodate 34 new students in the initial 1981-1985 period, the number of which would increase to 175 during the peak 1991-1995 period. Whereas the initial student population would require the equivalent of about one new classroom each for grades kindergarten through 6 and 7 through 12, the peak education demand period of 1991-1995 would require the equivalent of 4.2 new classrooms for the 105 new students in grades kindergarten through 6 and 3.5 new classrooms

for the 70 new students in grades 7 through 12. Additionally, construction, operation, and maintenance activities wouls be affected with such community facilities and services as transportation, communications, solid waste disposal, public safety, health and social services, recreation, and local government. (See the discussion of the partial enclave case under the mean [proposal] case). The extent of added impact on such facilities and services over the mean case cannot be determined with any precision, but it is evident the added development and especially operations population would materially impact Yakutat beyond that expected in the mean case.

The demands of this maximum scenario on the community of Yakutat would profoundly and rapidly alter the political, social, and economic organization of the town, rapidly transforming the community into an oil and gas-dominated economy and community within 10 years of the onset of development. Yakutat would no doubt undergo a severe housing crisis and declining quality in public services, inflation in the cost of goods and services, environmental deterioration affecting subsistence resource utilization and thereby lifestyles dependent upon subsistence. Impacts on families and individuals would be severe in many cases, including response to the environmental degradation, noise, and visual pollution, stress associated with loss of social and political control of the rapidly expanding community, and the reorientation of this economy to a predominantly oil and gas directed economy in which relationships to a primarily Anchorage-based industry will supplant past ties with communities and economic interests in southeast Alaska and fishing centers further south (Seattle primarily).

The rapid increase in demands for expansion of water, sewer, electrical, and health systems, the likely increase in accidental and other emergency health demands, increasing alcohol and drug abuse, family conflict, and stress-related illnesses should all be anticipated under this scenario. More fundamentally, the whole fisheries and subsistence-based character of the town would, without provision for full enclave settlement, be rapidly transformed into a totally different community, largely of a kind opposed locally. Community opinion as recently measured by Alaska Consultants (1975) shows support for moderate growth (up to about 1,500 population) which preserves the cultural integrity of Yakutat. This rapid development scenario would most probably violate this cultural integrity, producing an unknown, but certainly major, impact on individuals, families, and the sociocultural system itself. Since the option to fully enclave such a large oil and gas development population could be achieved through oil industry-city agreement, it appears that this option is the most realistic alternative available to the community of Yakutat if a development phase is initiated.

A liquefied natural gas (LNG) plant, for the maximum case only at Yakutat, would require approximately 81 hectares (200 acres), based on the size of the area leased by the Pacific Alaska LNG Company of Los Angeles from the Yak-Tat-Kwaan, Inc. This figure does not include associated docking facilities, but does include the area needed to house construction workers.

Primary impacts of LNG plant construction and operations have been fairly well documented (FERC, 1978). These include increased erosion and siltation; accidental spills of gasoline, fuel, and crankcase oil, primers, and paints; and the possibility of destroying cultural and/or aesthetic resources. Although archeologic and historic inventories have not been conducted on the probable

Table III.D.-1
Maximum Case
POPULATION

Year	OCS-Related Population: Development Phase Oil	Development Phase LNG	Development Phase Total	Operations Phase (1) Oil	Operations Phase (1) LNG	Operations Phase (1) Total	Area (2) Base Population	Yakutat Population (1) + (2)	Percent Increase
1976-1980	0	0	0	0	0	0	604	604	0
1981-1985	97	0	97	169	0	169	639	808	26.4
1986-1990	413	358	771	434	91	525	746	1,271	70.4
1991-1995	0	0	0	637	236	873	877	1,750	99.5
1996-2000	0	0	0	611	248	859	934	1,793	91.9

Source: ISER, TM 2, 1979; Alaska Consultants, TR 33, 1979; Alaska OCS Office.

Table III.D.-2
Maximum Case
FAMILY HOUSING AND RESIDENTIAL LAND

Year	Non-Enclaved Pop. (1)	No. (2) Families	Apt. Units No. (3)	Apt. Units Acreage (4)	1-Family Units No.	1-Family Units Acreage (5)	Total Res. Acreage	Total Net Res. Acreage (6)	Total Street Row
1976-1980	0	0	0	0	0	0	0	0	0
1981-1985	169	55	6	0.40	49	12.25	12.65	9.11	3.54
1986-1990	525	169	17	1.13	152	38.00	39.13	28.17	10.96
1991-1995	873	282	28	1.87	254	63.50	65.37	47.07	18.30
1996-2000	859	277	28	1.87	249	62.25	64.12	46.17	17.95

(1) Operations phase population.
(2) Based on a family size of 3.1 persons per family.
(3) Assumed to be ten percent of the housing stock.
(4) Based on a density of 15 dwelling units per acre; multiply by 0.405 to obtain hectares.
(5) Based on a density of 4 dwelling units per acre.
(6) Assumed to comprise 72 percent of total residential acreage, with residential street rights-of-way consuming the remainder.

SOURCE: ISER, TM 2, 1979; Alaska OCS Office.

Table III.D.-3
Maximum Case
BASIC PUBLIC UTILITIES

Year	Non-Encalved Population (1)	Water Supply (in gallons) (2)	Sewage Treatment Capacity (in gallons) (3)	Total OCS Population (4)	Domestic Electric Needs (in kw) (5)
1976-1980	0	0	0	0	0
1981-1985	169	21,125	63,375	266	798
1986-1990	525	65,625	196,875	1,297	3,891
1991-1995	873	109,125	327,375	873	2,619
1996-2000	859	107,375	322,125	859	2,577

(1) Operations phase population.
(2) Assumed 125 gallons per capita per day; multiply by 4.545 to obtain liters.
(3) Assumed three times daily per capita water use; multiply by 4.545 to obtain liters.
(4) Development and operations phase population combined.
(5) Assumed three kilowatts per capita daily need.
SOURCE: ISER, TM 2, 1979; Alaska OCS Office.

Table III.D.-4
Maximum Case
EDUCATION

Year	Non-Enclaved Pop. (1)	Total Number Students	Number Students		Number Students	
			K-6 (3)	7-12 (4)	K-6 (5)	7-12 (6)
1976-1980	0	0	0	0	0	0
1981-1985	169	34	20	14	0.8	0.7
1986-1990	525	105	63	42	2.5	2.1
1991-1995	873	175	105	70	4.2	3.5
1996-2000	859	172	103	69	4.1	3.4

(1) Operations phase population.
(2) Assumed 20 percent of the population.
(3) Assumed 60 percent of the student population.
(4) Assumed 40 percent of the student population.
(5) Based on a classroom size of 25.
(6) Based on a classroom size of 20.
SOURCE: ISER, TM 2, 1979; Alaska OCS Office.

site of the LNG plant, it is assumed that such surveys and subsequent mitigating measures (salvage archaeology) would be required pursuant to Federal laws and regulations due to the necessity of Federal permit approval prior to construction of such a facility. The performance of salvage archaeology, if required, could adversely affect the quantity and quality of scientific information obtained from the potential sites. In addition, routine operations of LNG plant facilities may require up to 6,000 gpd (4 gpm) freshwater, plus several million gallons needed initially to hydrostatically test proposed LNG storage tanks.

Clearing the right-of-way and burying the pipeline would result in loss of habitat for birds and terrestrial mammals, and in diversion of waterflows because of trenching and/or soil compaction. It has been estimated by USGS that between .6 and 1.5 yd^3 of earth would be disturbed per linear foot of pipe.

There would be localized impacts on terrain because of road construction, the use of heavy equipment, the need for gravel extraction, and the need to dispose of haul road spoils. If the area were revegetated, the site would eventually assume a near normal appearance. In addition, there will be short-term impacts from potential blasting, trenching, vehicle emission, noise, odors, and visual degradation. Any loss of habitat can be offset by converting any facility to another use beneficial to the community after it is no longer needed for the oil industry, and if attempts are made to revegetate and restore any disturbed land.

b. Impact on Local Economy of Yakutat: In the maximum petroleum scenario, which is assumed to involve an LNG plant and more resources, both a full enclave and a partial enclave forecast must again be considered.

The employment impacts of the maximum full enclave LNG plant situation are shown below.

Table III.D.-5

Maximum Petroleum

Yakutat Employment Forecast

With Full Enclave Variant

(1)	(2)	(3)	(4)	(5) (2)+(3)+(4)
Base Case Local Employment	Yakutat Non-OCS Local Employment	Yakutat Local OCS Employment	Enclave and Offshore Employment	Total Employment
1980 301	301			301
1985 365	328	37	226	574
1990 439	395	44	554	993
1995 501	451	50	351	852
2000 519	467	52	349	868

Source: BLM/OCS estimates

Notes: 1) See similar table III.A.2.b.-1 Proposal for Derivation.

2) Maximum employment (not shown) of nearly 2000 occurs temporarily in the late 1980's due to LNG plant construction.

As the employment forecast shows - column (1) compared to the sum of column (2) plus (3) - the use of a full enclave results in no increase in Yakutat local employment but rather a transfer of some of the non-OCS increase in local employment over the period 1980-2000 to the petroleum sector. Most of the large increase in OCS employment, which reaches a peak of 1998 in 1987 (not shown), is isolated commercially in the full enclave. Thus the results of the maximum petroleum scenario in the full enclave case is similar to that in the proposal, that is, the impact is mild to moderate stimulative with limited dislocation. A main difference between this maximum scenario full enclave variant and the similar proposal scenario is a very large increase in local petroleum tax base due to the assumed LNG plant. This might, of course, generate increased stimulative local spending if the $1,500 per capita tax limit can be evaded. Also different is the high LNG construction peak.

The maximum scenario employment impact with the LNG plant assumption and the partial enclave assumption is shown below.

Table III.D.-6

Partial Enclave Variant of
the Maximum Yakutat
Local Employment Scenario

	(1)	(2)	(3)	(4)	(5)	(6)
	Base Case Yakutat Employment (End of period)	Yakutat Resident Local Petroleum Employment (5 year average)	Yakutat in Migrant non Enclave Employment (5 year average)	Secondary Employment (5 year average)	Yakutat in Migrant Enclave Petroleum Employment (5 year average)	Total Yakutat non-Enclave Local Employment (5 year average) (1)+(2)+(3)+(4)
1980	301					301
1981-85	365	27	46	52	62	490
1986-90	439	33	131	121	506	724
1990-95	501	29	212	96	---	838
1996-2000	519	33	196	91	---	839

Notes: 1) ISER, Technical memo #2. See similar table in proposal for sources and methodology.

2) ISER Mean LNG case impact is used to adjust maximum resource case impacts to the LNG assumption

3) Peak employment is larger than 5 year averages and may amount to several thousand in the late 1980's. However, it is development employment and contained in construction enclaves.

4) For purposes of summing to column (b) all secondary employment is assumed inmigrant. This results in some double counting of non-immigrant secondary employment in column (1) and (4).

As the table shows employment in the base case grows in the 1980's from 301 to 439 or by 3.8 % per year while local nonenclave employment in the maximum case grows from 301 to 724 or by a booming 9.2 percent per year. Similarly while direct local petroleum hiring is not too large in Column (2) relative to non-OCS employment growth in Column (1) it could be disruptive if not controlled to prevent depletion in local skills. Moreover, a portion of the secondary

employment in column (4) will probably come from local labor markets, as well as immigrants. Industry, purchasing could also be disruptive if not controlled as assumed in the proposal. This might occur despite the tendency of the industry to purchase directly outside because of the base size of development. Finally, the assumption of an LNG plant in this case implies possible further enormous increases in local government tax revenues above the proposal case if the $1,500 per capita tax limit can be slipped and thus the need to control government spending to prevent aggravation of boom conditions.

The immediate impact of a LNG plant on water quality in the Yakutat area would arise from the disruption of the inshore marine environment due to pier and plant construction, along with the probable harbor and channel dredging to allow accommodation of LNG tankers. The dredging effects would be of a periodic nature and the areal extent affected would be quite small in comparison to the overall area available to the Yakutat community and the marine biological resource habitats.

During the plant operational phase, accidental, small-scale spillage of petroleum products would probably constitute the major source of water degradation. LNG has an extremely deleterious effect upon marine organisms, but due to its rapid evaporation and low solubility in water, the effects are short-term.

LNG tankers will discharge waters from the desalinization units and ballast water while in port. Little impact on water quality is foreseen from these sources. Treated liquid effluents would be discharged into the harbor from onshore facilities. With adequate controls, and following Federal and state water quality guidelines, relatively few problems are foreseen with regard to the building and operation of a LNG facility in Yakutat.

As with water quality, air quality would be affected by construction activities. The major sources for debasement of the air quality would arise from the use of fossil fuels in construction equipment and the dust raised by general construction activities.

During the operations phase, the major source of air pollution would be the gas fired turbines used in the liquefication trains. Approximately 95 percent of all plant fuel use would be utilized by the turbines. Current LNG facilities are capable of operating within the Alaska Air Pollution Regulation limits.

Additional sources for air quality degradation would be the plant incinerator, minor plant fuel use, occasional gas and refrigeration leaks, the venting of LNG vapors during ship loading, and the tankers' use of bunker and fuel oil for ship operations while in port.

Inevitably, temporary degradation in air quality would arise from accidental, small-scale emissions. However, with a well maintained, modern LNG plant, little impact on air quality is probable in the Yakutat area.

Conclusion: If 1,400 barrels of a major blowout were to drift to shore, it could result in a poor spawning year for most of the salmon near Yakutat. A poor spawning year could mean a loss of 100,000 to 200,000 fish. Under worst case conditions, there is about 1 chance in 5 of this occurring. Such a loss would undoubtedly severely impact Yakutat's subsistence and nearshore

commercial fishing interests. Such a severe impact to nearshore coastal commercial and subsistence fishing activities, as well as the construction and operation of an LNG plant at Yakutat, would result in a severe impact on the lifestyle of Yakutat.

In the maximum resource case, with a full enclave agreement, the Yakutat local economy will likely experience mild to moderate economic impact in terms of employment and income, as well as vast increases in government revenue from an increased tax base. This most likely case assumes crucially, however, that Yakutat will contain both construction and operating immigrant employment in separate enclaves and that other impacts are mitigated by local government-industry agreement. If there is slippage in this assumption, and only a partial enclave for construction workers occurs, boom conditions and the economic transformation of the town may occur.

Adequate implementation of the enclave assumption as the preferred method of development would significantly moderate overall impacts on the lifestyle of Yakutat. Such impacts on the lifestyle of Yakutat would be extremely severe under the partial enclave case, with the potential onshore LNG facility generating a large number of operations personnel that would live in Yakutat during the potential life of the field.

Cumulative Effects: The additive effect of the maximum case, including a possible LNG plant in Yakutat and the other development activities in and potentially impacting the Yakutat area as cited in the cumulative effects of the proposal could result in moderate impacts on the lifestyle of Yakutat under the full enclave assumption. Such additive effects could be severely compounded if the enclave concept were not adequately implemented.

Cumulative effects on Yakutat due to othr OCS sales, e.g., sale 39, 60, LCI, and 46, would not impact Yakutat because of either their non-development status such as sale 39 in the northern Gulf of Alaska, or their great geographical distance from Yakutat as in the case of Cook Inlet OCS activities or Kodiak. Valdez TAPS tanker traffic neither stops at nor travels even remotely near enought to Yakutat to be considered for cumulative effects.

Unavoidable Adverse Effects: There are probably no unavoidable local economic adverse effects from the maximum case on Yakutat because it appears that local options include containing boom condition adverse effects in tight employment enclaves through the local control of land needed for petroleum development. However, as with all forecasts this in uncertain at this time. Thus major unavoidable adverse effects along with large benefits may occur in Yakutat if full enclave development does not occur.

If enclave development is adequately implemented by all concerned parties, then the unavoidable adverse effects on the lifestyle of Yakutat will have been moderated.

IV. LIST OF PREPARERS

A. Contributing Authors and Supporting Staff Members:

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V. CONSULTATION AND COORDINATION:

A. Results of the Scoping Process for Proposed OCS Sale 55: The following material summarizes the process of publically examining the more significant issues and alternatives believed relevant in the proposal and the conclusions reached. The more significant issues raised throughout the scoping and environmental assessment process provide the basis for considerations of the impacts of the proposal and its alternatives of OCS Sale 55 in the eastern Gulf of Alaska.

1. Background: Invitations to Federal and state agencies for separate scoping meetings was initiated in February 1979. A second series of letters were sent to a wide variety of environmental special interest groups as well as the oil and gas industry that included Sale 39 lessees.

The third phase of the scoping process was to conduct 2 public meetings in the most affected community, the city of Yakutat, and additional meetings for general public input in Anchorage itself.

Table V.A.1.-1 summarizes the attendance and written response to our invitations and announcements (public notices in newspapers in Anchorage preceded the public meetings by approximately 1 week). Our most useful and productive response was from Yakutat. Public and special interest group response (including the Federal and state structure) both via written responses and in public meetings in Anchorage was not as strong as Yakutat's local response.

2. Summary of Scoping Results: Appendix G describes the results of the scoping process in a number of subsections. The first part consists of Federal agency responses, the second consists of the State of Alaska's responses, and the third consists of comments from a public meeting in Anchorage. The fourth includes comments from a public meeting in Anchorage, as well as comments from public meetings in Yakutat. This material was all studied and weighed for its relative significance to the major leasing decison to be made. It is noted that many minor issues were mentioned during the process. However, these, based on the strength of the scoping participation and the judgment of the EIS evaluation team, do not represent the more outstanding environmntal considerations at risk. Therefore, these minor topics are not pursued in any major depth in the analysis presented in the EIS. Nevertheless, it is recognized in all such cases that they are involved impacts with this sale. To indicate to everyone this recogniton, some discussion of each topic is still included in the EIS, although in a lesser way than for the major issues listed following. The following is a summary of the major scoping issues and the alternatives suggested by this process.

In summary, the major environmental issues resulting from our evaluation were as follows. It is around these that the principal analysis of the EIS is centered.

Environmental Issues

1. Impacts on the maintenance of Yakutat's lifestyle;

2. Impacts on the local economy of Yakutat;

3. Impacts on fisheries resources;

4. Impacts on endangered and threatened species;

5. Impacts on cultural and historic resources;

6. Impacts on water quality; and

7. Impacts on air quality.

These impacts have been marked with an asterisk in the table of contents. These summary scoping issues represent a synthesis of not only public comments made by Federal, state, local governments, and the general public, but also the environmental analysts of the Bureau of Land Management who compiled the FES.

Alternatives: The alternatives concluded significant to the decision and the major environmental issue, involved were: (1) to hold a sale (2) to cancel the proposed sale, (3) delay the sale, or (4) modify the proposal with various tract deletion options listed below.

Tract Deletion Options

a. delete (60) nearshore tracts opposite Dry Bay
b. delete (133) nearshore and northwest tracts

3. List of Contacts for Scoping Comments:

a. Federal Agencies:
Department of Agriculture
U.S. Forest Service
Department of Commerce
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
Office of Coastal Zone Management
Office of Ecological and Environmental Conservation
Department of Defense
Army Corps of Engineers
Department of the Army
Naval Operations
U.S. Air Force
Department of Energy
Department of the Interior
Bureau of Indian Affairs
Bureau of Mines
Bureau of Land Management
State Director Fish and Wildlife Service
Geological Survey
Heritage Conservation and Recreation Service
National Park Service
Department of the Treasury
Department of Transportation
Environmental Protection Agency

Joint Federal-State Land Use Planning Commission

b. State of Alaska:
The Honorable Jay S. Hammond, Governor
State-Federal Coordinator, Division of Policy Development and Planning
Department of Administration
Department of Commerce and Economic Development
Department of Community and Regional Affairs
Department of Environmental Conservation
Department of Fish and Game
Department of Health and Social Services
Department of Highways
Department of Labor
Department of Law
Department of Natural Resources
Department of Public Works
Department of Revenue

c. Local Government:
Cordova, Alaska
Honorable Jim Poor, Mayor Perry Lovett, City Manager

Seward, Alaska
Honorable Richard A. Neve, Mayor

Yakutat, Alaska
Honorable Larry Powell, Mayor
Fred Kent, Superintendent of Schools Cornelia Howard,
Yakutat Health Center

d. Native Corporations:
Chugach Natives, Inc.
Eyak Corporation
Eyak Village Council
North Pacific Rim Native Association
Sealaska Corporation
Yak-tat-Kwaan, Inc.

e. Oil and Gas Industry:
Alaska Oil and Gas
Amoco Production Company
Atlantic Richfield Chevron USA, Inc.
Cities Service Company
Exxon Corporation
General Crude Oil Company
Marathon Oil Company
Placid Oil Company
Shell Oil Company
Texaco, Inc.
Union Oil of California

f. Special Interest Groups:
Alaska Center for the Environment
Alaska Conservation Society
Alaska League of Women Voters
Alaska Public Interest Res. Group
Alaska Wildlife Federation and Sportsman's Council, Inc.
Arctic Institute of North America
Audubon Society, Anchorage Chapter
Bertha's Brokerage
Cordova Aquatic Marketing Association
Cordova District Fisheries Union
Environmental Center, West Anchorage High School
Friends of the Earth
Greenpeace Alaska
Izaak Walton League of America
Prince William Sound Aquaculture Corporation
Seward Fisheries
Sierra Club
The Trumpeter Swan Society
Trustees for Alaska
Wilderness Society

B. List of Contacts for Preparation of the Draft Environmental Impact Statement: A number of Federal, state, and local government agencies, academic institutions, industrial firms, and special interest groups were consulted prior to and during the preparation of the draft environmental impact statement (DEIS). Agencies and groups which were contacted for information or input are included in, but not limited to, the following list:

1. Federal Agencies:

Department of Agriculture (USDA)
Forest Service (FS)

Department of Commerce (USDC)
Bureau of the Census
Office of Coastal Zone Management (CZM)
National Marine Fisheries Service (NMFS)
National Oceanic and Atmospheric Administration (NOAA)
Outer Continental Shelf Assessment Program (OCSEAP)
Economic Development Administration

Department of Defense (DOD)
Department of the Army (DOA)
Corps of Engineers
Department of the Navy
Naval Arctic Research Laboratory (NARL)

Department of Energy (DOE)

Environmental Protection Agency (EPA)

Department of Health, Education and Welfare (HEW)
Public Health Service (PHS)

Department of Housing and Urban Development (HUD)
Federal Housing Administration (FHA)

Department of the Interior (DOI)
Bureau of Indian Affairs (BIA)
Bureau of Land Management (BLM)
Alaska State Office
Land Office
Division of Resources
Fish and Wildlife Service (FWS)
U.S. Geological Survey (USGS)
Conservation Division
Geologic Division
Water Resources Division
National Marine Fisheries Service (NMFS)
Heritage Conservation and Recreation Service (HCRS)
National Park Service (NPS)

State Department

Department of Transportation (DOT)
Coast Guard

2. Federal-State Agencies:
Joint Federal-State Land Use Planning Commission

3. State Agencies:

Office of the Governor
Coastal Zone Management Program (CZMP)
OCS Coordination

Department of Commerce and Economic Development

Department of Community and Regional Affairs
Division of Community and Rural Development

Department of Environmental Conservation

Department of Fish and Game

Department of Health and Social Services
Division of Public Health

Department of Labor

Legislative Affairs Agency

Department of Natural Resources
Geological and Geophysical Surveys

Division of Lands
Division of Minerals and Energy Management
Division of Parks

Department of Policy Development and Planning (DPDP)

Department of Revenue

Department of Transportation and Public Facilities
Division of Facility Planning and Research

4. Local Communities:

Anchorage
Cordova
Seward
Yakutat:
City Council
City Manager
Mayor
Planning and Zoning Commission

5. Native Corporations:

Chugach Natives, Inc.
Yak-tat-Kwaan, Inc.

6. Academic, Environmental, Industry, and Others:

Alaska Airlines
Alaska Center for the Environment
Alaska Consultants, Inc.
Alaska Oil and Gas Association (AOGA)
Atlantic Richfield Company (ARCO)
Bertha's Brokerage
Brigham Young University
Chevron Oil Company
Dames and Moore
Evergreen Helicopters of Alaska, Inc.
Greenpeace, Alaska
Hubbs Sea World
International Pacific Halibut Commission
Kodiak OCS Council
Livingston Helicopters
Mobil Oil Corporation
Naval Ocean System Center (NOSC), San Diego, California
New England Fish Company, Seattle
North Pacific Fishery Management Council
Peat, Marwick, Mitchell and Company
Portland State University
Sierra Club
University of Alaska
University of Alaska Museum

Washington State University
Whitney Fidalgo, Cordova

C. Coordination and Review of the Draft Environmental Impact Statement Leading to Preparation of the Final Environmental Statement:

1. Review and Analysis of Comments Received: Comments and testimony were received from a diverse group of individuals, groups, organizations, companies and local, state, and Federal agencies. Comments ranged from support of the statement and the proposal to requests for major revisions of the statement and postponement or withdrawal of the proposal.

The latter portion of this chapter contains copies of correspondence received from Federal agencies, state governments and agencies, as well as other representative organizations and individuals that were felt to represent the major relevant concerns regarding the draft statement and the proposed action. Answers to the comments are also included.

All comments and letters received were first reviewed relative to either corrections and editorial changes to the draft statement or issues raised. Where possible and appropriate, the environmental statement has been revised to correct errors and omissions, and to clarify and/or augment discussions of issues of concern. Individual notation of all of these minor corrections and additions is not provided in this section. Instead, the document was simply corrected, and responses provided in the following part are devoted only to the more significant comments made by reviewers. All substantive issues were analyzed to determine which revisions were necessary to strengthen and improve upon the draft statement. The final statement reflects, wherever possible, the consideration given to all of these issues. The letters received from all substantive reviewers are printed herein.

The following are responses to the specific comments on the DEIS received by the BLM/Alaska OCS Office:

Comment No.	Federal Comments/Responses
	Response to Nuclear Regulatory Commission.
1	Comments noted.
	Response to Federal Energy Regulatory Commission.
1-4	Suggested changes made.
5	In response to your concern for having OCS sale 55 on the presently proposed sale schedule, please refer to sec. I of the DEIS in which the relationship of the proposed sale to the overall leasing program is discussed. In addition, the recently published Draft and Final Environmental Statements on the Proposed Five-Year OCS Oil and Gas Lease Sale Schedule discuss at length the nature of the scheduling of proposed OCS sales.
	Response to U.S. Army Corps of Engineers.
1	Comment noted.
2	The comment is inaccurate. The sentence on page 120 in the DEIS states, "...a slick from a major spill, such as a tanker accident, might cover up to 100 sq km."
3	Suggested changes made.
4	The format of the EIS includes a discussion of cumulative impacts under each alternative.
	Response to Heritage Conservation and Recreation Service.
1	Please be advised that the Alsek pipeline scenario has been deleted from the FEIS. An explanation for the removal of this particular scenario has been included with the history of mitigation section.
2	We have re-analyzed the recreation and tourism sections of the DEIS. The paragraph on page 162 which indicated the possibility of continued low recreational use for the Yakutat area has been deleted.
3	The Alsek pipeline scenario option has been deleted from the FEIS, and the impact discussions modified accordingly.

4 Comment noted.

5 The BLM will recommend to the Geological Survey's Area Supervisor after an OCS sale as to which tracts should be surveyed, based on special studies contracted by BLM and other available information.

6 The probability designations on the graphics do not indicate that the BLM has made a decision. The probabilities shown do indicate those areas that may have had a relatively high, medium or low level of probability of human habitation in that area at some time in the last 20,000 years. The probabilities do not indicate that any human remains or artifacts have survived the intervening period of geologic history, nor that said probable artifacts are detectable by state-of-the-art techniques, nor do they suggest the actual occurrence of historical artifacts on a given tract.

7 If and when it is determined that an activity resulting from this proposed sale has the potential for disturbing these sites, prior to the acitivty's approval, a determination of effect in accordance with 36 CFR 800 would be made.

Response to the Geological Survey.

1 We have made the adjustments on pages 3 and 4 to reflect the low probability of a resouce find. We agree that oilspill risks under the exploration only case should be lower than under production; however, the oilspill risk is in fact based on the assumption of oil being discovered and produced.

2-6 Suggested changes made.

7 The mean case is shown in the EIS to be repesentative of the resource range which has a 5 per cent chance of any resource occurring. Since this has now been explained several times in the EIS, and since we are comparing representative results for a resource case in the EIS, we do not believe it is necessary to cite the low probability of a resource case each time a case is presented. For EIS purposes, we are comparing the results of a resource case and neither the favorable nor unfavorable impacts need continually reflect the risk of no resource finds in order to present a balanced analysis.

8 We have corrected page 7 so that it references the requested material in Appendix B.

9 This correction has been made.

10 As in Comment No. 7, we believe that since we are presenting a group of representative impacts for a mean case where resources are found, the impact on alternative supplies should also reflect a representative amount of resources. The environmental and other impacts of resources alternative to the representative case where resources are found needs to be discussed and the non-commercial risk is not germane to this balance.

11 The suggested change in the table has been made.

12 Our understanding of the resource estimates for alternatives provided by G.S. is that the uncertainty surrounding the deleted areas is such that it is not possible at this preliminary stage to show that the deletions reduce the resources. The estimates used in the oilspill model are problematical and do not represent an official determination of resource estimates for the proposed lease area by the USGS.

13 The source of water supply in Yakutat is considered adequate for community and OCS needs, as indicated by baseline and impact studies of Alaska Consultants. Groundwater utilized by well and storage tank systems is used in Yakutat by both the city and the existing supply base. An intertie between these independent systems has been discussed in Yakutat. The source of water supply in Cordova is more complex and marginal, even for present demands, according to the above reports. The Cordova context generally was not addressed in the DEIS due to the assumed focus of OCS activities on Yakutat.

14-18 Suggested corrections made.

19 Suggested changes have been made.

20 The entire oilspill analysis is based on the assumption that hydrocarbons would be commercially developed. Probabilities are appropriately determined subsequently without factoring in the probability of discovery.

21 You are quite correct, however, the accuracy of the bar scales is indeed separate from the circles.

22 On the contrary, dynamically positioned drillships would not be able to adjust to multiple wind-wave combinations as easily as a semi-submersible. Experience with the Diamond M Drillship in lower Cook Inlet had borne out this fact.

23 The discussion of USGS responsibilities and analysis of OCS Operating Orders in Appendix B was provided as shown in the DEIS by the USGS upon request of the BLM. The final OCS Orders for the Gulf of Alaska have been referenced in sec. I and Appendix B.

24 & 25 Suggested corrections made.

26 Graphic No. 2 was significantly modified.

27 Despite the information shown on the graphic, the BLM has not yet given the Geological Survey official notification of specific tracts requiring surveys. Your procedure to consult with the BLM/OCS on this matter is certainly most appropriate.

Response to the U.S. Department of Agriculture.

1 The FEIS has been revised to show the removal of the Alsek River pipeline development scenario and the Icy Bay scenario. Appropriate figures and impacts have also been modified to reflect the deletion of the Alsek pipeline scenario and the Icy Bay scenario.

2 Suggested corrections made.

3 The discussion of Federal regulatory responsibilities outlined in pages 14-18 of the DEIS refers to only those Federal agencies with responsibilities over various potential aspects of OCS activities. In addition, please refer to Graphic No. 10, depicting land use, for a discussion of USDA land management responsibilities.

4 We do not consider effects of gas/oil pipeline construction as a major impact resulting from Alternative I. Experience elsewhere in Alaska (Cook Inlet) has shown that with correct construction techniques now available, only minimum short-term impacts occur because of pipeline construction of the type required for offshore production facilities.

5 Please refer to Graphic No. 10 on land use for discussions of national forest management and responsibilities. Prudhoe Bay's oil reserves are approximately 10 billion barrels and the mean case for proposed sale 55 is only about 450 million with a 95 percent chance of no discovery--hardly a worthwhile comparison.

6 The Yakutat Bay area, specifically the southeastern part including Knight, Khantaak, and other islands, are designated as high density winter range for deer (ADF&G, 1973a). Thus, significant populations of deer should be present.

7 Suggested changes have been made.

8 This office does not have access to statistics which would indicate the future growth in use for the disparate recreational areas of the Yakutat region. We agree that the recreational use of the Yakutat area will tend to increase over the long run with the Alsek River enjoying particular favor.

9-12 Suggested correction made.

13 Suggested changes have been made.

14 Please refer to pages 115-116 of the DEIS for a discussion of seismic constraints on oil and gas activities in the proposed sale area. The report by Thenhaus (1979), as referenced on page 116, is in fact an earthquake risk analysis of the entire State of Alaska, including the area from the Alsek River to Haines.

15 Please consult a USGS topographic map of the area of interest for local topographic elevations.

16 Suggested correction made.

17 The discussion on page 129 is primarily for illustrative purposes. Further discussion of effects of the proposal on salmon populations and the commercial fishery can be found on pages 131 and 132, and elsewhere in the text. These discussions agree with your comment.

18 Suggested changes have been made in terms of redefining in greater detail the nature and relationship of an industrial compound to the community of Yakutat. This approach has in fact been coordinated with the city of Yakutat. The subsequent deletion of the Alsek gas line route would significantly reduce, if not eliminate, a variety of potential use conflicts with the Tongass National Forest. Similarly, the elimination of the alternative to use Icy Bay with an associated pipeline route would effectively eliminate any impact on the onshore coastal forests.

19 The Alsek pipeline route has been deleted as a viable scenario and, as a result, there would neither be any short- or long-term effects on the Tongass Forest or National Monument areas.

20 The level of impact upon the recreational use of the Yakutat region is dependent entirely upon the effectiveness of an enclave. A full enclave situation would have a minimal effect on the recreational use of the area. In any event, recreational conflicts would decline once the construction phase of OCS activities has passed. The

number of personnel involved with onshore duties during the production phase of proposed sale 55 would number approximately 40 individuals. We agree that the long-term use of recreational resources of the Yakutat region would tend to increase.

21 In answering this comment, we refer you to the EIS sections dealing with lifestyle and socioeconomics. These sections have been rewritten and contain a discussion of the effects of not only a full enclave, but a partial one as well. The land use impacts section, on which you have commented, was written from the viewpoint that only a partial enclave would be in operation.

22 The reason an LNG plant was not included in the development scenario for Icy Bay is because the Geological Survey's economic analysis indicated that an LNG plant would be economic only under the maximum find case, and it would have to be located at Yakutat. In the FEIS, the only alternative--the Alsek pipeline route--was dropped.

23 & 24 Suggested changes made.

Response to the U.S. Environmental Protection Agency.

1 Appendix 6 of the programmatic FEIS contains considerable discussion of the Department of the Interior's current views on the adequacy of deep water drilling technology. In summary, the capability for deep water drilling has been in existence for several years and, in fact, a surplus of that capability is expected to continue for several more years. The deep wells drilled in the next several years will probably be drilled by a dozen major oil companies in order to meet lease or concession obligations. Production user technology is the only limiting factor in the ability to exploit reserves of hydrocarbons occurring in deep water. Before that exploration can take place, the price of oil will have to increase significantly in order to make it economically feasible. Alternative V in the FEIS does in fact offer for deletion virtually all of the tracts occurring in deep water.

Potential geologic hazards to OCS oil and gas activities are discussed in Section III.A.1.e. Geologic hazard information acquired from contracted surveys is currently being evaluated on a tract-by-tract basis. Recommendations on possible necessary tract deletions or special lease conditions due to geohazards will be made to the Secretary prior to any final decision on the proposed sale. The discussion in Section I.B.8. indicates that the Secretary has the option and the opportunity to consider this alternative to the proposal.

2 All of the appropriate impacts, both as a result of exploraton and subsequent development and production, are considered because this is the chain of events set in motion by a fundamental decision to lease. Major impacts would be unaccoundted for if only exploratory impacts were highlighted and development impacts down-played.
EPA was given every opportunity during the scoping process to raise issues of major analytical concern but chose not to do so. This issue was not considered to require major emphasis during scoping and our view that it is not major remains unchanged.

3 The draft EIS has been significantly modified with results of the geotechnical studies conducted during mid-1979 as part of the BLM/NOAA/OCSEA program. Please refer to sec. II.G.1. describing the OCSEAP studies program for the status of geologic studies, as well as others, in the Gulf of Alaska.

Secondly, the Oilspill Trajectory Analysis included in this FEIS was based on the physical oceanographic data available, and not sale 39 data, as mentioned in your comment. All EIS's are written on the basis of available knowledge and not future or as yet uncertain results of new research programs.

Insofar as your comment concerning a delay of decision-making pending additional biological studies, it should be recognized that a very full consideration has been given under the Delay of Sale Alternative (III). Furthermore, the nature of the OCSEAP studies program is such that various research efforts often extend well past the publication date of an EIS or a given sale decision, and that such subsequent studies information can be used in the post-sale decisionmaking process.

4 (a) You are correct in that the Oilspill Model does not incorporate the probability of an infinite vaiety of potential seismic events. Instead, the spill model utilizes well known statistics for the occurrences of spills in relation to productive capacity or transport, and recreates such events synthetically, using a Monte Carlo approach to generate a series of Oilspilll trajectories and "hits" on numerous resources. Probabilities of the causative agents responsible for a spill occurring are not incorporated. The quantification of these remote factors is not known and their interrelationship highly conjectural. Thus, the probabilities of seismic events, human error; e.g., the probability of installing a blowout preventer upside down, or a ship collision due to a falling meteorite, are not incorporated. For the purposes of the Oilspill Trajectory Analysis and the uses to which it is put, it simply is quite unnecessary to include an extreme event probability theory for highly unusual causes of an oilspill.

(b) Your are incorrect. The Oilspill risk model does not in point of fact put any emphasis on the effectiveness of oilspill cleanup technology. The spill model treats each hypothetical spill trajectory as if there were no oilspill containment and/or cleanup at all. This ensures a completely natural pattern of movement for an oil slick. The probabilities thus derived for impacting either various parts of the shoreline or other offshore resources are wholly natural. By not including a statistical factor for oilspill cleanup effectiveness, the spill model actually does put considerable emphasis on the debatable subject of offshore cleanup. It presents worst case conditions.

(c) Again, please refer to Appendix 6 of the OCS programmatic FEIS for a discussion of the type of technology that might be used in deep water conditions. The wide spectrum of oil and gas publications currently available, in particular, the series of Offshore Technology Conference publications, are replete with descriptions of equipment from subsea completions to pipelines that have been installed worldwide, some in high seismic risk areas such as coastal areas of circum-Pacific countries.

It should also be recognized that OCS Operationg Orders mandate any operator desiring to install such systems in a high seismic risk area demonstrate as a prerequisite to permit approval to the Geological Survey that said equipment can be safely operated under the prevailing environmental conditions.

(d) We quite agree, and if any such internationally unique biological species had been identified in the proposed lease area during the scoping process, then all concerned parties could have created new, special, protective stipulations. Your comment would have been more useful if you could have identified those specific biological species which you consider to be unique to the proposed lease area.

(e) Narrative concerning EPA's discharge responsibilities has been expanded and incorporated in Sec. I of the FEIS. In addition, lists of tracts with water depth and distance from shore have also been included.

5 Comment noted.

Response to the U.S. Department of Commerce.

1 The circulation model of the area uses the baroclinic and barotrophic data bases which is interfaced with a representative wind matrix to determine the oilspill trajectories.

2 This comment would be much more helpful if it were specific and had been provided early on in the planning process as required by regulations. NMFS was invited to contribute to the scoping of this EIS and failed to provide significant input or suggestions for any of the major alternatives under consideration. The suggested alternatives provided here (including a broad variety of possible development options) are adequately covered in the EIS as now constructed. Furthermore, it should be recognized that decisions on the location of an oil terminal, pipelines, or an LNG plant are not the subject of this EIS because they are not decisions that will be made by Interior or even necessarily influenced by the DOI in the timeframe of the leasing decision. This is a decision document on whether or not to lease, and if so, how and where. Decisions on particular development options are many years downstream in the planning process and would be then reviewed under NEPA if any Federal involvement exists. Development scenarios are postulated at this time only to help understand the possible impacts of leasing in a broad spectrum.

3 The actual figures on amounts of coastline impacted by an oilspill cannot be quantified at this time. The chance of a spill hitting the shore is 31 percent within 3 days, given the constraints of the oilspill risk analysis. The second part of this comment has been incorporated in the text.

4 Neither the scoping process nor the environmental assessment by BLM identified this as a major issue of concern. Please refer to sec. III.A.1.d., results of the USGS Oilspill Trajectory Analysis and Miles Hayes' study of shoreline sensitivity to such oilspills as described on pages 109-115.

5 Your comment is not quite correct. Impacts will differ. The probabilities for impacting various marine and shoreline biological resources vary considerably depending on the source point for the spill. We therefore, disagree. Considerable information has been provided in both sec. II and III of the EIS, which support the various analyses on the effects of oilspills on a wide variety of marine resources and ecological environments likely to be impacted.

The disposal of ballast water would probably be fairly similar to what is done at Valdez. In that case, no ballast is disposed of in the open marine environment, but is actually pumped ashore for treatment and redischarge. The surveillance of such operations is a USCG responsibility.

The determination of the relative probabilities of a spill from an offshore loading terminal versus an onshore terminal are reflected in the results of the oilspill risk analysis included in the EIS. In fact, the results show

less chance of a spill reaching shore that emanates from Alternative VI with an offshore loading terminal than for onshore terminals.

6 Please refer to pages 120-126 of the DEIS for a discussion of oilspill affects on marine habitats and food web resources; i.e., bioaccumulation and tainting. Also, refer to Graphic No. 3 on marine habitats, especially pelagic habitats, for discussions on phytoplankton and filter feeders, as well as table III.A.2.a.-1.

7 Your comment has been noted and included in the FEIS.

8 It appears that this comment may represent NMFS's conclusion on their endangered species consultation process for the Gulf of Alaska. BLM is still waiting to review NMFS's Endangered Species Biological Opinion on this issue.

9 Comment noted.

10 The impacts of pipelines is included in the FEIS, and is an acknowledged problem in all OCS areas. Because of that, there was and there is a specific stipulation included in the DEIS and FEIS to reduce these impacts by what you have proposed.

11 The summaries in the FEIS do include the probable impacts for commercial fish species and commercial fisheries of the area. Our analysis of sportfish species does not indicate that the impacts assessed would be major enough to be included in the summaries.

12 The use of shrouds, e.g., sand bags or wire mesh blankets over any protuberances on the pipeline, have been considered elsewhere prior to their use in the pipeline mitigating measure for this EIS. In particular, we refer you to the FEIS for sale 48, offshore California, for further narrative on this subject.

13 Your comment has been noted and the FEIS changed to reflect it. The discussions on bottom dwelling fish and herring were and are contained in the DEIS and FEIS.

14 The paragraph was included as to give scale to the impacts on a commercial fish species from the various industries that affect the population. The oilspill risk analysis was used to assess impacts on salmon populations and included drift information.

15 The section is a summary of impacts and contents in that context.

16 Because of their dependence on inshore areas for migration routes, spawning, larval survival, and juvenile feeding, salmon may be the most vulnerable commercial species in the area to be affected by this proposal.

Salmon fry, especially pinks, remain in estuarine areas near Yakutat for several months, so would be especially vulnerable to oilspills. The reduction or loss of a year class along part of the coast would be especially serious if it affected the pink salmon for which there are naturally alternating strong and weak year classes (due to poor littoral food supply, abundance of predators, or some other natural biophysical factor).

Even low, sublethal concentrations of oil stress pink and chinook salmon, as shown by increased respiration rates and by behavioral avoidance (Brockson and Bailey, 1978; Thomas and Rice, 1975; Rice, et al., 1976). This effect is probably true in the other untested species of salmon. This means that salmon may avoid inshore waters which are contaminated wit oil. The inshore areas are also the locations in which salmon are commercially harvested in gill nets, as described in the section on commercial fisheries.

A pollutant event caused by this proposal may adversely affect a year class of fry as well as a year class of adults.

The salmon population reduction due to an oilspill impacting the littoral zone can perhaps be approximated by the natural difference in the size of the strong and the weak year classes of pink salmon fry returning to the coast near Yakutat. During the last 12 years, the commercial catchs on the weak, even-numbered years have averaged one-seventh the poundage of the catches on the strong, odd-numbered year classes. This natura difference between good and bd year classes of pink salmon implies that the catch of salmon along the Yakutat coast might be reduced to one-seventh of that caught in 1978 as the result of an oilspill.

17 Your comment is noted and changes made in the FEIS.

18 Delay-of-sale is evaluated in the EIS under Alternative III. It should be noted that the reality of advancement of technology, and the results of future research studies, are uncertain. At present, the only known method for the determination of oil and gas reserves is to drill and test the geological formations of interest. Any other methodology would only be an indirect approach and not a physical confirmation of the presence or absence of oil and/or gas.

Availability in the future of research and information generated by the BLM/NOAA OCSEA program can be used not only in the EIS-sale process, but also in the many future additional steps in the leasing process (refer to Comment No. 1, USDA).

19 This portion of the EIS is merely a short summary of probable impacts. Expanded discussions on impacts on fish species and commercial fisheries are presented in sec. III.A.2, 3, 4, 5, 6, and 7. Your comments are answered there.

20 The section has been rewritten to include the information provided.

21 The complete analysis of impacts that are contained in sec. III.A.6. indicate that impacts to commericial fisheries would be reduced by 33 percent (bottomfish) and 43 percent (salmon and crab). We believe that is a large enough reduction to justify the insignificant rating in Table I.C.-1.

22 Smith and Geraci (1975) conducted an experimental study on the effects of immersion and ingestion of oil on ringed seals and white-coat harp seal pups. Their study provides data on the acute effects of oil pollution on ringed seals only with a short exposure to oil.

The study showed that the fouling of ringed seals did not cause medical damage and plugging of the body orifices. The study concluded that if oil were to cause thermo-regulatoru problems, they would occur shortly after birth.

Other seal studies in the field showed some kidney damage and liver problems. Liver damag seemed to be mild and probably reversible, but kidney damage seemed to be related to an unsuccessful attempt to either concentrate or excrete oil. The full extent of kidney damage is unknown.

Smtth and Geraci (1975) found that eye damage to seals was the most significant physica impairment, and concluded that the seals' continued exposure to oil could result in severe and possible permanent eye disorders, depending on the length of exposure.

Smith and Geraci (1975) also conducted ingestion experiments to assess the effects of ingested crude oil. They found only transient enzyme release. If there was damage, it was negligible, indicating that the oil a seal might ingest was not irreversibly harmful. Furthermore, any live oil-contaminated food item would unlikely be lethal.

Preliminary results of another study on the physiological effects of oiling on fur seals indicated that small amounts

of oil caused a significant increase in the metabolic rate of fur seals in water for many days after application of the oil (Gentry and McAlister, 1976).

Davis and Anderson (1976), in their field observations on the effects of oil on gray seals near Pembrokeshire, England, reported that cows appeared to locate and feed pups successfully whether both were oiled or unoiled. Oil, in itself, did not appear to preclude normal mother-pup relations. Conclusions showed that the behavior of oiled seals did not appear to differ from that of unoiled seals. However, the peak weight of an oiled pup was significantly lower than that for an unoiled pup on the beach. In addition, attempts to clean oiled pups were useless as the pups quickly became recontaminated.

Oiled gray seal pups observed on Ramsey Island (offshore Pembrokeshire), were apparently unaffected by a thick coating of fuel oil. Another observation showed that 14 oil-contaminated dead, gray seal pups, were washed onshore along the North Dyfed Coast, England (anonymous, 1970, as reported by Davis and Anderson, 1976). However, information was not available to determine whether oil was or was not the cause of those deaths.

The largest recorded oil pollution incident involving the contamination of seals was in the Santa Barbara Channel off southern California in 1969. Investigations from that oilspill on certain marine mammals showed no detectable adverse impacts and showed that the number of dead animals was not abnormally high (LeBoeuf, 1971; Brownell and LeBoeuf, 1971; Orr, 1969; Simpson and Gilmartin, 1970).

However, Connell (1973) analyzed the data of Brownell and LeBoeuf (1971) on the mortality of sea lion pups and showed tht the dead pups had more oil on their bodies than expected. Connell (1973) interpreted this to mean that either the dead oiled pups had picked up more oil than live pups, perhaps because the dead were washed about in the surf.

LeBoeuf (1971) stated, "The crude oil which coated weaned elephant seals at San Miguel in March and April 1969 had no significant immediate or long-term (1-15 months) effects on their health." However, LeBoeuf also concluded that, "Had the elephant seal rookery been contaminated early in the season when the females were nursing, pups might have ingested crude oil and more consequences would have ensued."

Oil apparently does not permanently damage seals if carefully removed. However, cleaning operations are not justified unless all sources of contamination are first removed. In open sea areas that are seal migration routes, seals infrequently come in contact with oil; however, when

seals enter busy ship lanes, oil contamination may be more frequent.

Harbor seals and sea lions do not depend upon large pelage for insulation and are not as vulnerable to the effects of oiling as are sea otters or fur seals. Contamination of breeding rookeries that are frequented by harbor seals and sea lions would be very detrimental if it occurred during the pupping season (June and July). Both adults and young animals are in danger of becoming oiled; young are also susceptible to accidental ingestion of oil while nursing.

Since pinniped rookey mortality may be density dependent, abandonment of a pupping area because of oil contamination could force animals into an already crowded rookery area or an area adjacent to the rookery which has less favorable habitat conditions. This could raise mortality rates of young seals and sea lions. Rookery abandonment from oil contamination would be expected to last for at least 1 year and possibly longer depending on the location, extent of oiling, and providing there are no successive oilings of the rookery.

The potential then exists for a decrease in the breeding population in the contaminated region. The significance of this impact would depend upon the time period, extent of the contamination, and the number of oilings. Should the rookery recover over a period of several years, the potential exits for repopulation of the area.

23 & 24 Suggested changes made.

25 Your comment has been noted. Our discussions throughout FEIS concerning the importance of herring and the probable impacts on the species from the proposal agree with your comment.

26 Sec. III.A.1.d., Gulf of Alaska Oilspill Analysis, and Sec. III.A.2.a., Littoral and Nearshore Habitats, contains discussions of size of spills and expected numbers of spills that were used in the impact analysis. A change has been made in the text refered to in this comment to indicate the size of a large spill.

27 The FEIS has been changed to reflect the correct mathematics. We agree that a major spill could adversely effect the salmon populations.

28 Your comment has been noted and the FEIS changed to reflect it.

29 The discussion of probable numbers of adult salmon lost due to a major pollutant event is an attempt to quantify or give a numerical example of the severity of loss based

on some natural factors. It is not to be construed as an absolute number, but only as an example.

30 Yes. Alternative V offers for deletion a considerable number of offshore tracts which could result in the protection of marine organisms from OCS activities on the tracts deleted. Please refer to a more detailed description of this alternative in sec. I.

31 Yes, Alternative V offers offshore tract deletions for reasons similar to those suggested in your comment.

32 OCS statistics show that for past offshore oil production, there is an average of 1 blowout for every 2,860 wells drilled. Since only 70 wells would be drilled, according to the scenario, the odds of a blowout would be even less, or approximately 1 chance in 119,000.

33 Please refer to answers for Comments Nos. 14, 16, and 29 regarding this same comment.

34 Suggested changes made.

35 A very full consideration of the Delay-of-Sale Alternative (III) in sections I and III has been given in the FES. Various research efforts of the OCSEAP studies program often extend well past the publication date of an EIS or a given sale decision, and such subsequent studies information can be used in the post-sale decisionmaking process. In many cases, site specific topical studies may not be immediately necessary until it is clearly evident that a commercial find has been made and industry begins their site specific development process. This process can, and historically often, occurs over many, many years; thus, one year delay would not necessarily be relevant to this developmental process which may or may not occur.

36 Please refer to the Environmental Geology Graphic (No. 1) included with the FEIS for geo-hazard data which was recently obtained by the USGS under contract to OCSEAP during the fall of 1979.

37 The proposed action and alternatives have considered the more significant issues of concern in view of reults of scoping, the environmental assessment, and public comment, and review processes. In particular, the Alsek River pipeline scenario and the Icy Bay pipeline scenario have not been inclued in the FES because of onshore land status and public concern in those areas. Thus, impact discussions of these technical development scenarios do not appear in the FES.

There have been some modifications to the DEIS which should mitigate substantially the impacts referred to in

your comment. First, the Alsek gas line route has been deleted and therefore many of the related types of impacts would be negligible. Also, Alternative V in the DEIS, has similarly been deleted thereby negating any potential geohazard effects of routes to the Icy Bay area as well as potential problems in Icy Bay or the Malaspina forelands.

In addition, the proposed action concerns primarily the question of whether or not to lease, and if so, on what terms and conditions in the proposed lease area for sale 55. The Environmental Geology Graphic (No. 1) has been changed to show the most recent OCSEAP geo-hazard data available. Please note that in the event an industry proposal were presented to appropriate local, state, and Federal governmental regulatory agencies in order to acquire appropriate permits to construct some onshore facility, then undoubtedly a considerable effort could be put forth to study in detail specific sites in all their aspects, not just geo-hazard ones.

38 Please refer to pages 92-98 of the DEIS for a discussion of the BLM/NOAA OCSEAP program. The Environmental Geology Graphic (No. 1) shows the most recent geo-hazard data available from the USGS under contract to OCSEAP.

The ongoing geologic research referred to in your comment has in fact been incorporated on the Environmental Geology Graphic (No. 1), and in the overall environmental assessment of what the environmental risks are as posed by these geotechnical problems. Please note that most of these geotechnical problems are of the nature that the site specific geohazard survey conducted by the lessee prior to receiving an approval by the USGS of a drilling permit application will determine whether or not the specific drilling site would or would not be affected. In the event a problem is genuinely demonstrated, then the USGS and the BLM in an advisor capacity may require the lessee to move the drilling site away from the problem or modify the drilling and/or casing and mud programs to effectively solve the problem in a respectable geotechnical and engineering manner.

39 Avifauna and their habitat use, especially in the western area from Cape Suckling to Icy Bay, was not indicated as a major issue. Therefore, extensive detail of this nature is not included. We consider your information correct, however, and we appreciate the notation. In addition, the deletion of Alternative V in the DEIS would also reduce further potential impacts on avifauna in the Icy Bay area.

40 Please refer to pages 92-98 of the DEIS for a discussion of the BLM/NOAA OCSEAP program, and to the response to Comment No. 37, Department of Commerce.

41 The discussion of impacts on birds is a discussion of potential impacts in general, indicating possible gross damage from oil pollution and disturbance. However, based on the mean case, the impacts are likely to be moderate. Thus, the conclusion does not refute the discussion, but forecasts the most probable mean case impacts. Certain key qualifying words have ben changed to clarify this point.

42 Planned future studies, the results of which are presently unknown, cannot provide any certainty of mitigating effects. The DOI has continuing authority to regulate operations and require changes as necessary.

43 The proposed sale 55 area was not compared with other parts of the Gulf of Alaska such as the western gulf, which has major marine mammal rookeries on Marmot, Tugidak, and the Barren Islands. The sale 55 area does represent a smaller portion of the overall seal and sea lion populations in the Gulf of Alaska. However, secondary habitats such as the Yakutat area are relatively important as alternative hauling areas for seals and sea lions that normally haulout in other parts of the gulf. These areas may be very important when considering the cumulative effects of hydrocarbon development activities throughout the Gulf of Alaska.

Icy Bay was not mentioned as an important pupping area. The mention of Icy Bay having one of the most spectacular concentrations of harbor seals is an exaggeration. However, the number of seals is high for that part of the gulf. Also refer to response to Comment No. 11, Whale Center.

Sea otters do occur in Yakutat Bay, as well as west of Kayak Island in the Hinchinbrook area according to ADF&G (1973a). However, they are indicated as present in greater numbers in the latter area.

44 The fur seal is included in the description on Graphic No. 7. However, the Fairweather Grounds are not shown on the map as a fur seal wintering area. Fur seals are now mentioned more often in the discussion of impacts on marine mammals (sec. III.A.2.-a.) in response to your comments.

45 We recognize that the available data base is not complete in any academic sense. The analysis has to proceed on the basis of what is available, however.

46 In response to your comment on Alternative V with respect to increased adverse effects on harbor seals, clarification of the character and degree of potential impacts has been made (see sec. III.A.6.a.).

47 A comparison of the major species caught in the Yakutat region and the entire Gulf of Alaska is contained in the FEIS. Opinion regarding evaluation completeness and techniques vary. We believe our analysis is sufficient. The level of information necessary to adequately portray impact has been provided.

Study information is contained in sec. III.G. The data gaps you consider major would be of interest to us.

48 The level of development information and the uncertainty of the proposal ever reaching the developmental stage precludes attempting to develop probable impacts on individual stocks of fish. We agree with your comment that should development cause pollutant events that adversely affect pelagic salmon, the results could be far-reaching and not constrained to the immediate Yakutat area. However, analysis beyond this point is not possible since the events themselves which must be postulated are so uncertain.

49 Evaluation of effects were made by using the estimated level and locale of oil and gas development to stress the fish resources of the area. There will be a relatively low level (2 producing platforms) of development, stressing a relatively large resource base. Conclusions were made as accurate as possible, given the known uncertainties of petroleum resource size, location and type. The use of OCSEAP information was used throughout the analysis as a perusal of the Literature Cited section will show.

50 Section III.G.1. discusses past, ongoing, and future studies of major living (non-human) resources of the proposed sale area. While the description is not verbose it does give a good idea of the program. In the discussion on the effect of Alternative III on fish resources, direct mention is made of a probable effect of providing more biological information by delaying the sale.

51 Major changes have been made in the text discussions of cetaceans and the worst case impacts section. Specific data that would display a more specific analysis than we have been provided would be welcomed if you should care to produce it. We are not aware of what "sightings," what natural history "data," or what vulnerability to insult factors you are referring to. Studies are underway in an attempt to addresss the importance to the humpback whale of the areas near proposed sale 55. We do not believe sufficient data exists at this time to identify humpback habitats to any greater level of refinement than presently shown on Graphic No. 8, an admittedly unrefined portrayal. The Endangered Species Act Section 7 Consultations underway are expected to address this issue. We await your studies biological opinion.

52 Please refer to pages 92-98 for a description of the BLM-NOAA OCSEAP program. In addition, a rough draft synthesis report by SAI for OCSEAP and BLM was submitted very late and incorporated.

53 Environmental impact statements are generally written on the basis of the present state of knowledge, not the unknown future state of knowledge expected from research that is not yet completed. Also, future knowledge can be applied to future leasing decisions, as appropriate.

54 The section also includes discussion of larval stages of and food resources for commercial, sport, and subsistence finfish and shellfish.

55 Impact evaluation is made using the results of the oilspill risk analysis furnished by the Geological Survey. OCSEAP studies are not designed solely for use in an environmental impact statement. They are ongoing and will be available for pre and post-lease decisions. EIS's are written on available knowledge. Refer to Sec. II.G for a description of the most current BLM-sponsored OCSEAP studies.

56 Please refer to the map in Graphic No. 3 which shows the contrasts in the coastline.

57 Refer to the Oilspill Risk Analysis section on pages 109-114 of the DEIS, and to the map on Graphic No. 3 showing contrast in the susceptibility of the coastlines. In this section, there is a sensitivity analysis of the NEGOA-Yakutat Forelands coast to oilspills.

58 Please refer to pages 92-98 for a description of the BLM/NOAA OCSEAP program. All information is never available on all aspects of a decision. We have used what information is available, indicated the needed data gaps on endangered species, and indicated uncertanties where they exist.

59 While the oilspill trajectories moved west of the proposed sale 55 area, their origin was within the sale area to simulate the fate of a spill from an exploratory or production well.

60 The physical oceanographic information shown on the Physical Oceanography and Meteorological Graphic has been substantially revised to reflect the point of this comment. The oilspill risk model has most certainly incorporated the latest wind and current data over the same areas as noted in your comment and further utilized current information provided by NOAA/OCSEAP. Therefore, the current velocities and circulation patterns noted in your comment have definitely been incorporated in the

circulation input data to the USGS oilspill trajectory model.

61 The oilspill trajectory model used by the USGS contained the most up-to-date current and circulation information as provided to them by NOAA/OCSEAP. Planned and future studies, especially those for the mid-80's, the results of which are presently unknown, cannot provide any certainty of mitigating effects by delaying the sale. Neither have you described any major problem of environmental impact likely. We have reviewed the habitat and population information available and believe our assessment is reasonable and sufficient.

62 Your editorial comments are much appreciated. However, it is often difficult to combine issues and impacts because so many readers prefer different levels of detailed specificity. Perhaps, in future EIS's the format you desire could be more cost effectively pursued.

Response to the U.S. National Park Service.

1 The Alsek pipeline scenario has been deleted from the FEIS. It was never a true decision option for the DOI, only a possible alternative scenario that others might have considered.

2 The pipeline route to Icy Bay is somewhat generalized at this time. If, in fact, monument status in the future precluded this route in its overland aspect, and if the issue of a pipeline route were the subject of subsequent EIS's, then other alternative routes could be considered such as an all-marine pipeline route to Icy Bay. The hypothetical terminal facility shown in Alternative V in the DEIS for Icy Bay is not located on government land, and therefore, not subject to either monuments, wilderness or other NPS land classifications. During sale 39, the Chugach Native Corporation advertised this site for such purposes. In any case, the subject of the present EIS is not pipelines, but a leasing decision offshore.

3 That is correct, except that the Alsek pipeline scenario has been deleted from the FEIS.

4 The Alsek pipeline scenario has been deleted from the FEIS, and appropriate impact discussions modified accordingly.

5-7 Suggested changes made.

8 The Alsek pipeline scenario and the Icy Bay scenario have been deleted from the FEIS and appropriate impact discussions modified accordingly. It should be recognized that the selection of pipeline routes is not the subject of this EIS. The pipeline route to Icy Bay is hypothetical and most general in nature. If this issue were the subject of an EIS on pipeline routes, then many alternative routes could be considered such as an all-marine route to Icy Bay or whatever was necessary to avoid monument lands.

9 Suggested change made.

10 Appendix D is taken from a BLM/OCS Socioeconomic Studies Program report authored by the Institute of Socioeconomic Research (ISER) of the University of Alaska. The ISER document was published prior to the publication of the DEIS for proposed sale 55, and was under preparation prior to the Presidential Proclamation of December 1, 1978.

11 The stipulation does apply to Federal actions on the OCS. Land based impact controls are under the jurisdiction of State and local governments generally, and not something that can be stipulated in a Federal lease since the Federal government cannot exercise any control jurisdiction.

12 Preconstruction surveys could be made before any onshore facilities are to be developed if State or local governments require it. If archaeological and historical sites or artifacts are found, the process of placing it on the National Register of Historical Places can be followed.

13 Please see response to Comment No. 11 above.

14 It is not likely that the Wrangell-St. Elias area would be impacted. If it should be impacted, the procedures suggested in the document would be followed.

15 National Park Service archaeologists also would be involved in any archaeological activities on service lands, according to relevant regulations such as 36 CFR800.

16 Your preference is noted. The choice will be up to the Secretary at decision time.

17 Positive effects means discoveries resulting from implementation of National Park Service and other protective services programs and policies.

18 The discussions of subsistence and lifestyle have been revised for the final EIS. Please refer to sec. II.C.1. and III.A.2.b. in the FEIS.

19 The material has been referenced according to your suggestion.

20 We appreciate your interest in Dr. Langdon's expertise and we are sorry he missed the comment period. The public comment period on the DEIS for proposed sale 55 officially closed November 9, 1979. Considerable public notice was given during the scoping process prior to the writing of the DEIS and additional public notice was given prior to the public hearings and the public comment period after the DEIS was publically released. The record has to close sometime to allow the EIS to be completed.

Response to Fish and Wildlife Service.

1 The issues raised by your comments with reference to mitigating measures have been reviewed and taken into consideration in the development of measures included in sec. I.B.1.b. With respect to the 6-nautical-mile buffer zone referred to in your comment, please note that Alternatives IV and V consist of nearshore tract deletions that would provide more than sufficient buffering for the reasons cited in your comment.

Lighting on rigs: The issue of working lights attracting birds has been addressed as a possible Information to Lessees through ongoing coordination at the field level. At this time, there is insufficient data to support this as a mitigating measure. Safety and navigational lights are addressed in the appropriate rules and regulations enforced by the U.S. Coast Guard and the Geological Survey Oil and Gas Supervisor.

Aircraft control: This issue has been addressed as a possible Information to Lessees through ongoing coordination at the field level. Refer to Graphics Nos. 6 and 7 showing seabird colonies and marine mammal rookeries in the nearshore area between Yakutat and Dry Bays.

Limitations on discharges: The Fish and Wildlife Service may not be aware of the fact that discharges of any kind from offshore drilling platforms must be in compliance with Environmental Protection Agency regulations as they apply to EPA's NPDES permits, which must be acquired for all offshore platforms. Thus, an additional lease stipulation on limitation of discharges would be a duplication of authorities, regulations and activities already under permit authority of the EPA.

Platform placement and onshore siting: Placement of platforms and space competition from infrastructure siting onshore may be of concern when and if oil and/or gas is discovered. The proposed action addressed in this EIS for sale 55 relates to decisions by the Secretary of the

Interior concerning the terms and conditions of a sale, if one is held, and not specifically to platform placement and onshore development activities. Such activities may occur at some future time, and would be addressed in a developmental EIS prepared at a future date, should oil and/or gas production be found commercially feasible. These activities are regulated by OCS Orders published in Federal Register, Volume 44, No. 247, December 21, 1979.

2 Ongoing coordination with the Fish and Wildlife Service, Anchorage, has resolved this comment with respect to Endangered Species Section 7 Consultation. Existing data indicates that it is not likely oil and gas activities in the proposed lease area would jeopardize endangered avian species. Refer to DEIS pages 144 and 145 for a discussion on endangered species, and in particular, refer to page 147, Conclusions, for clarification.

Comment No.	State of Alaska Comments/Response.
1	Suggested changes in the text have been made. The FEIS acknowledges Federal approval of the Alaska Coastal Management Program. Refer to sec. II.D. of the FEIS.
1 & 2	The FEIS discusses the consistency review procedures of the Federal Coastal Zone Management Act. Refer to FEIS sec. I.B.1.b., II.D. and III.A.2. At the time of the proposed Notice of Sale, the DOI will review the content of the proposed notice to determine if any activities described in that notice will have direct effect on the Coastal Zone, and if so, will make a consistency determination for any such activities.
3 & 5	The comments regarding the current status of Yakutat's Coastal Management Program development have been incorporated in the FEIS text. Refer to sec. II.D.3.
4 & 6	The state's request for a delay-of-sale for the benefit of District Coastal Management Program development and approval has been acknowledged in the FEIS. Section III.A.4.e. of the FEIS evaluates a delay-of-sale alternative upon coastal zone management.
7 & 8	Section III.A.2.c. discusses impacts of the proposal upon the Yakutat District Coastal Management Program. The FEIS finds that the integrity of the district program would not be adversely affected by the proposed sale date for the following reasons: (a) post-sale permitting action would occur after a District Coastal Management Program is approved; (b) the state ACMP provides adequate authority for consistency determinations of proposed OCS actions which would "directly affect the coastal zone."

9 & 10 In general, a comparison of the tracts requested for deletion in the States' combined areas of A, B, and C, total 133 blocks including partial blocks along the territorial boundary. Alternative V in the FEIS was specifically designed to give considerable protection through the deletion of 132 blocks to the nearshore and offshore fishery concerns as identified in the comments for area A. Simiarly, the rationale for offering deletion of tracts in the nearshore portion of Alternatives IV and V is very similar to the comments expressed on Area A. Federal regulations under 30 CFR 250, revised Gulf of Alaska USGS OCS operating orders, EPA's NPDES permit process, and the Coast Guard responsibilities in the event of a spill, provide considerable applicable mitigating measures to protect the fish and other biological resources in Areas A and B. We have included the tracts designated as "Area B," however, as a possible deletion alternative in Chapter I.

11 The FES has identified in the subsections under Legal Mandates and Authorities, Federal Regulatory Responsibilities, Lease Stipulations, and other mitigating measures the means by which the discharge of toxic substance is regulated by EPA's NPDES permit process and USGS regulation of OCS operations under 30 CFR 250 and recently published new OCS orders for the Gulf of Alaska region (Dec. 21, 1979; Federal Register). In addition, the Coast Guard has an established procedure for regulating the oilspill contaminant and cleanup process including the deployment of personnel and equipment. The industry's oilspill cleanup organization, GOACO, has stockpiled a considerable list of equipment for such contingency use purposes in Yakutat, Valdez, Anchorage, Kenai, and Kodiak.

Both alternatives IV and V have been included in the FES in part to help mitigate on a preventive basis any commercial fishing conflicts with OCS activities particularly on tracts comparable to areas A, B, and C. In addition, the Fisherman's Compensation Fund, as a result of the OCS Amendments Act, should provide considerable financial recompense for any justifiable losses to commercial fishing as a result of OCS activities. These established mitigating measures, as well as the alternatives offered in the FES, would provide the adequate mitigation referred to in the comments.

12 & 13

The changes to Graphic No. 4 that were provided to us have been made, and we believe the FEIS expresses the fishing values of these areas. In estimating impacts from development of these areas, however, it must be kept in mind that for the development of the total area, only 2 production rigs are estimated to be needed. The loss of 20 to 30 acres of fishing area because of rig placement in an area that covers almost 2 million acres, does not seem to be excessive, nor should it cause significant impacts. We believe the impacts given in the FEIS reflect this level of development. The FES has identified a considerable array of mitigating measures under the following: Legal Mandates and Authority (including discussions on the OCS Lands Act), Federal/State Coordination, Establishment of Compensatory Funds, Environmental Studies Program, and the National OCS Advisory Board, and the Intergovernmental Planning Program; Federal Regulatory Responsibilities (including those in particular under 30 CFR250); Lease Stipulations (particular to proposed sale 55); and other mitigating measures. The Lease Stipulations offered include a stipulation for Protection of Cultural Resources, a stipulation for an Orientation Program, a stipulation on pipelines, a stipulation on wells and pipelines and an information to lessees notice on aircraft disturbance of bird and mammal rookeries.

In addition, a new set of USGS OCS Operating Orders have been published for the Gulf of Alaska (December 21, 1979; Federal Register). These mitigating measures, in addition to the alternatives to the proposed action as described in section I of the FES, should be more than adequate to provide the necessary degree of environmental protection of the commercial fishing and fish resources contained in areas B and C. The proposed lease area is located on the northern margin or fringe of the Fairweather fishing grounds. The majority of the commercial fishing done on Fairweather grounds lies to the south of the proposed lease area.

In addition, the degree of preventive mitigation--especially in terms of the disposition of drilling muds and cuttings, platform fluid discharges, formation waters, and the disposal of any other toxic or contaminated fluids--is more than adequately covered by EPA's NPDES permit process and the USGS' OCS Operating Orders and regulations supervising OCS activities.

In view of the available environmental information, mitigating measures available as described in the FES, the alternatives offered to the proposed action, in particular, alternative V, and the marginal extent of commercial fishing that occurs in area B relative to the majority of the Fairweather grounds fishing area which lies to the

south outside the proposed lease area, it has been determined that the amount of environmental protection to be gained by offering area B for deletion is rather small. Nevertheless, we have included a discussion of "Area B" and three tracts in "Area C" as deletion alternatives in Chapter I.

In the case of area C being considered for deletion, note that alternative V in the FES offers for deletion 17 more tracts on the northwest portion of the proposed lease area for similar reasons as area C. In addition, all of the mitigating measures briefly discussed above for area B are also applicable for environmental protection of area C. The essential rationale for offering for deletion the northwest portion of the proposed lease area in alternative V, was the additional protection of the fish resources and commercial fishing activities of the area.

14 The 17th District of the U.S. Coast Guard, and not the Geological Survey, has the overall responsibility for oilspill cleanup. The Coast Guard also maintains a formal oilspill response organization. In addition, industry has formed GOACO, Gulf of Alaska Cleanup Organization, with a considerable stockpile of equipment already onhand for the same purposes as noted in your comment (refer to testimony submitted by Mr. Steger of ARCO which enumerates said equipment). Finally, each application to drill submitted to the USGS must include a comprehensive oilspill contingency plan which normally covers your items of concern.

15 No OCS activities have been suggested in the areas of your concern.

16 Normally, high velocity explosives are not used in or during most modern marine geophysical research operations. In any case, your comment is unfortunately lacking as to why explosives should not be used.

17 An Information to Lessees will be published covering the subject.

18 The USCG will initiate studies to establish vessel traffic lanes when it determines that marine traffic within the Yakutat region has reached a level substantial enough to warrent regulation.

19 We agree with the spirit of your comment and an appropriate pipeline and seabed equipment stipulation has been included in the FEIS.

20 Thank you.

21-23 We have revised the EIS to reflect a range of possible interaction selections for Yakutat and new petroleum personnel, and thus, now provide a range of possible economic and social impacts on Yakutat. Moreover, we have deleted the assumption in the mean case of an Alsek River Canyon pipeline and an LNG facility in the mean case as probably not commercial. The maximum case now shows the range of economic and social impacts from an LNG facility for those interested.

24 Yes, there is a summary of public testimony in the FES. The impacts on lifestyle, local economy, and fisheries have been substantially improved. In addition, testimony given by the Mayor of Yakutat and summarized in the FEIS does provide additional information relevant to your comment. In short, Yakutat at this time, is not officially opposed to sale 55, although they do have a number of concerns. Yakutat is in a significantly different position today than at the time of sale 39. They now have the legal institutions and organizations to cope with potential impacts. The CEIP program also exists now, which did not for sale 39. CZM is a State approved plan, which did not exist for sale 39.

At present, overall community experience and awareness is distinctively improved in Yakutat, as compared to sale 39.

25 & 26 The population figures have now been provided.

27 The possible disruptive impact of local petroleum hiring has been reconsidered and rewritten. The employment effect of the planned rebuilding of the second processing plant has been included in the base case.

28 The possibility of secondary immigration has now been covered in the range of possibilities for local petroleum development interactivity.

29 We believe the 5-year averages communicate a better hypothetical nature of development for costs. The peak amounts are presented in the text.

30 We considered the economic and social impacts on the southeastern region to be minor, and thus, they are not covered in the EIS. We believe most impacts would center directly in Yakutat.

31 In regard to the land use requirements for the enclave, your attention is directed to pages 164 and 165 of the DEIS. Your attention is further directed to the Final EIS for the Proposed Five-Year OCS Oil and Gas Lease Schedule. The FEIS states that although 200-300 acres may be required for onshore facilities, only 100 acres may actively be used. The land use requirements stated in the FEIS were computed for the needs of field sizes larger than that of the mean case of the proposed action for sale 55.

32-34 The Alsek pipeline scenario has been deleted from the FEIS and impact discussions changed accordingly. As a result, the concerns expressed in your comment have been thereby addressed.

35 Marine pipelines have been laid successfully all over the world in water depths greater than 1000 feet and for great distances. While operational problems may be encountered, they are most certainly within the range of current technological pipelaying capabilities.

36 The base case assumption in our analysis rests upon Yakutat as the terminal; thus, our analysis recognizes your point directly and fully.

37 Pipeline effects have been recognized. The level of impact analysis is in proportion to the subject of the EIS. This is not a site specific proposal at this stage of study. Many years will pass before detailed planning can be undertaken such as you propose. Your comments on Ophir Creek may be quite valid and would need to be dealt with in greater detail, if such an onshore facility becomes the subject of a site specific plan.

38 Your comment generally summarizes some of the environmental trade-offs inherent in the comparison of two alternate shore-based facility sites. However, this is not a site specific study of a site specific plan because such a plan does not now exist.

39 The Physical Oceanography Graphic (No. 2) has been appropriately modified.

40 Yes, tanker routes and tanker spills were definitely a part of the analysis. Please review pages 109-115 of the DEIS and USGS Open File Report No. 79-1784 for more information.

41 No, Yakutat Bay was not excluded. The land segment across the mouth of the bay represents the entire bay as a target to be impacted by an oilspill trajectory.

42 It is not a paradox. For hypothetical spill location A1, there is a 31 percent chance of a spill impacting the coastline somewhere. Given an oilspill impacting the coastline, there is a 42 percent chance of impacting a National Monument or a 53 percent chance of impacting coastal areas inhabited by wolves. These are considered conditional probabilities.

43 The net transport is toward the west which is driven in part by the Alaskan Stream. This generalized circulation pattern is influenced directly by the shelf and shelf break bathymetry.

44 Recent OCSEAP studies of the net circulation on the proposed lease area have been included in the EIS.

45 The circulation model of the sale area developed by Jerry Galt incorporates the most recent oceanographic data. The oilspill trajectories were run by the Geological Survey and includes some of the more relevant aspects of the MIT (73-74) study only.

46 Opinions differ between analyses of oil and gas development impacts. We would appreciate specifics on where our analysis is incorrect. We believe it to be complete. Discussions on benthic organisms and fish species in the FEIS do mention recovery time. The analysis in the FEIS does, however, take into account the low level of development estimated for the proposal and the low probability of pollutant events.

47 Katabatic winds could serve to buffer or reduce onshore transport of oil; however, this effect would be highly localized.

48 We note that you are aware of no specific resources that will be affected. Neither are we. We believe our analysis reasonable and correct. Any archaeological feature that undergoes transgression or erosion of a coastline will lose its integrity and coherence as a result of wave winnowing, and the final remains will consist simply of a lag deposit. Charcoal, wood, and other lightweight materials will be floated away or reduced to powder, and the components of structures consisting of more durable materials (stone hearths, masonry foundations, stone tent rings) will be

scattered. However, large, heavy objects (masonry blocks, stoneflakes, large bones) could survive recognizably as part of a diffuse lag deposit.

49-54 We concur with your comments. The EIS incorporates your concerns in the mitigating measures.

55 We perceive tourism as largely separate from activities related to hunting and fishing. We view a tourist as one who is on a trip for pleasure--very transient in nature--and not signficantly interacting with the environment. Some tourists fish but most fishermen in Alaska are not tourists.

56 The section in the EIS covering recreation and tourism deals with the subject entirely from an external viewpoint. Recreational activities of local inhabitants are discussed in the section dealing with lifestyle. During scoping, these activities were not surfaced as a major impact concern.

57 Suggested changes dealing with the growing popularity of the Alsek River as a white water expedition river have been incorporated in the text.

58 It is admitted that recreational use for all areas is not necessarily low. However, the Yakutat region's overall level of recreational use is far below 1970-72 levels. During this period, hunting and fishing were far less restricted.

59 It is understood that the area around the township of Yakutat is devoted to various types of recreational and subsistence activities. It is also understood that in a non-enclave situation, OCS activities during the developmental stage, would cause severe competition for local recreational and subsistence resources. However, we are assuming that an enclave situation would be in effect and that impacts would be mitigated. After the construction period of OCS activity has passed, the population within the enclave should rapidly fall to but a handful of individuals. Furthermore, these recreational pursuits were not identified in scoping as major environmental concern.

60 Extensive comment of a similar nature has been made and responded to by the U.S. Department of Agriculture and the National Park Service.

61 Suggested changes have been made.

62 A review of the oilspill trajectory analysis indicates that either a platform or tanker spill in the proposed lease area would tend to drfit away from Monti Bay because the Alaska current moves to the north and west offshore.

Therefore, it is not likely that Ankau Saltchuk would be impacted by an oilspill in the proposed lease area. However, if development occurred, and if an oil terminal were built near Monti Bay, and if there were a major tanker spill in Monti Bay, and if no containment were possible, and no oilspill cleanup techniques could be applied to such a spill, and if the wind were moving the oil slick in the direction of Ankau Saltchuck, then it appears possible tha this area could be impacted at least along the shoreline and beach areas. Miles Hayes' study of potential oilspill vulnerability on coastal areas did include analysis of the Yakutat Bay coastline. Hayes' results were incorporated in the oilspill analysis in section III of the FES. The specific kinds of oil effects on birds, mammals, and coastal habitat have been discussed in appropriate parts of section III. These discussions could be generally applied to a consideration of oil effects on Ankau Saltchuck.

63 The Yakutat Forelands have not been overlooked in the EIS. The forelands are mentioned as being important to waterfowl and shorebirds in the text incorporated with Graphic No. 6. However, key waterfowl and shorebird habitats not shown on DEIS Graphic No. 6 are being added to the final EIS.

64 Graphics Nos. 4 and 5 have been revised from the information provided. The corrections and additions needed for Graphic No. 6, Marine and Coastal Birds, have been made in the revised graphic for the final EIS. Graphics Nos. 2 and 10 have been substantially revised as suggested.

65 The suggested references have been incorporated in the FEIS.

66 Extensive changes and corrections have been incorporated in the graphics for the final EIS based upon the State of Alaska's review.

67-72 We agree that alternative technical assumptions can be made for the petroleum development scenario however, we have decided to retain our original assumptions as the closest approximation we can achieve or likely future conditions. Most of your specific questions cannot be answered until oil or gas is discovered. Technical development possibilities have not been included in the FES.

Comment No. Public Comments/Responses.

Response to Exxon Company, U.S.A.

1 Comment noted.

Response to Cities Service Company.

1-4 Comments noted.

Response to Southern California Gas Company.

1-4 Comments noted.

5 The FEIS has been changed to indicate that it may be possible to have a "small" LNG plant similar to the LNG plant at Kenai, Alaska, under a mean case resource estimate.

However, on the basis of an economic appraisal, it was considered less costly overall by the Geological Survey to utilize a gas pipeline. Despite this question over a comparative economic feasibility of gas pipeline vs. "small, medium, or large" LNG plant, the generic type of impacts associated with an LNG plant would still be similar to the impact discussion under the maximum case. In addition, please refer to the response to Comment No. 1 of the U.S. Department of Agriculture. In this light, it is important to realize that the present EIS is concerned with a proposed action of offshore leasing, and not with a proposed action for permitting the construction of onshore facilities. Onshore development would be subject to many other appropriate Federal, state, and local regulations.

6 & 7 Comments noted.

8 In the event of any specific onshore facility development, numerous Federal, state, and local regulations would apply. Please refer to the response to Comment No. 1 by the U.S. Department of Agriculture.

9 Please refer to the response to Comment No. 1 by the U.S. Department of Agriculture. Note also that the proposed action for which this EIS has been written concerns primarily the question of whether or not offshore leasing would be held and under what terms and conditions. All onshore facilities development activities would be subject to a wide range of appropriate Federal, state, and local regulations above and beyond the present EIS.

10 Comment noted.

Response to Mr. Bart Henderson.

1-5 The BLM is entirely in agreement with your Comments Nos. 1-5, and in a concerted response, has eliminated the hypothetical gas pipeline development scenario through the Alsek River area. As a result of this change, it should

not be necessary to include the extra impact analyses as your comments have suggested. In fact, any gas found at less than the commercial volume under the maximum find case would, for the purposes of this EIS, be shut in and probably not developed. Also, the Icy Bay development scenario has not been included in the FES.

Response to Telephone Comments by the Alaska Department of Fish and Game Biologist, Ron Ball, Yakutat, Alaska.

1-9 Suggested corrections have been made.

Response to the Alaska Trollers Association.

1 Your concerns have been recognized in the various sections dealing with fish species, both from a biological and a commercial standpoint. Impacts have been assessed and the FEIS acknowledges that there will be an adverse effect on commercial fishermen.

2 Management district 181 is the only one directly affected by this proposal. The other districts mentioned are to the south and east, which removes them from the analysis of impacts because prevailing ocean currents and distance should keep pollutant events away. However, the fact that power trolling is carried out in the area is contained in the FEIS and the effect of the proposal on this type of fisheries is analyzed.

3 Analysis of the impacts on the commercial fishing fleet and oil and gas exploration and development-related activities was and is discussed in the DEIS and FEIS in sec. III.A.2.b. In fact, the major impacts estimated to be caused by this proposal have been assessed in that section.

4 The alternative development scenario of a pipeline up the Alsek River has been deleted in the FEIS. Your recommendation for acceptance of Alternative IV has been noted and is contained in the FEIS.

Response to the American Cetacean Society.

1 Suggested changes have been made. The FEIS incorporates much updated marine mammal information.

2 Please refer to the updated graphics in the FEIS.

3 & 4 The blue whale is basically a pelagic species, ranging throughout the north Pacifc and only rarely found nearshore. Although individuals may suffer from occcasional contact with oil, it seems unlikely that incidental and occasional

oil fouling of baleen will create measureable consequences to blue whale populations. Further, there is no evidence that blue whales cannot avoid surface slicks, or restore baleen which has been only temporarily fouled. The right whale is of such small numbers at this time that drift buoy trajectories are net especially meaningful in terms of relationships to right whale feeding. Based on our present knowledge of baleen fouling, it is reasonable to assume that at least temporary deleterious effects to individual whales may occur. However, in consideration of what would be relatively low probability of frequent contact with surface slicks by widely dispersed individuals, baleen fouling as a factor affecting population trends is probably minor compared to other factors.

5 Fiscus, et al. (1976), estimte that the right whale population at approximately 150-200 animals. No recent sightings of the species have occurred in the Gulf of Alaska and some scientists maintain that the species may already be extinct. In consideration of such low numbers of animals, in conjunction with relatively low probability of oilspills as a result of the proposal, the significance of optical effects on right whale populations as a result of oilspills is probably small.

6 As suggested in the response to Comment No. 5, it is our opinion that the relationship of possible eye damage to cetacean population dynamics is difficult to assess at this time, but probably of minor significance. Modifications of text shown in the final EIS have addressed major physiological concerns.

7 The seasonal abundance of humpbacks known to be in or near the proposed lease area is presently under investigation, the results of which will be considered by the NMFS in Endangered Species Act Section 7 Consultation.

8 Revised portions of the EIS address this issue directly.

9 The relevance of potential sensitivity of humpbacks to boat traffic is noted. However, humpback occurrence in the proposed sale area is under investigation and until verification of their occurrence and dependency on the area is established, the question of effects of sale-related boat traffic on humpbacks cannot be addressed more specifically.

10 This comment has been addressed in response to Comment No. 20.

11 Our gray whale population estimate was based not only on Rice and Wolman's estimate of 1971, but also on a confirmation of this figure by Fiscus, et al. (1976). We find the estimates suggested in your comment at 16,500 crossing

Umiak Pass of interest, but suggest that further debate on the absolute number of gray whales is not particularly meaningful to the decision questions at hand.

12 This issue has been addressed in revisions of the EIS.

13 & 14 We concur with the comments and changes have been made.

15-17 We felt that a splitting out of non-endangered cetaceans from endangered cetaceans in the impact discussion would have been repetitious. It must be stressed that endangered species are our prime concern, and there is little information with thich to address each non-endangered cetacean in a meaningful fashion.

18 It would be inappropriate to address the pesticide and contaminant issue beyond the present extent. It can be argued that agricultural and industrial sources of pollutants are known major sources of contaminants and the proposed sale a minor potential source of such contaminants, as compared to other such sources.

19 We believe that alternatives proposed herein afford suitable protection to endangered species, as well as any measure which would be adopted as a result of Section 7 Consultation under the Endangered species Act.

20 Comment No. 20 suggests a well-intentioned precaution to halt drilling during the months of "peak migration and feeding" in order to protect the gray whale. The use of such a precaution in relation to gray whale feeding and migration would imply (a) that there is known intolerance of gray whales to drilling and exploration noise disturbance, and (b) that effects of a spill would impact a major portion of the species during a restricted period. It is well documented that this species has increased in numbers in spite of annual migration nearshore in heavy industrialized southern regions. In these regions, the species have demonstrated a certain degree of tolerance to noise and human activities. Reports of displacement of migration offshore in California are not substantiated scientifically, and at most, have been localized phenomena with little effect on population levels. The following quote (Geraci and St. Aubin, 1979:8) is of relevance: "Unlike the abrupt response to a sudden disturbance, most animals become habituated to low-level background noise such as would be associated with ship traffic and onshore and offshore petroleum activities. Those species which we are most familiar, e.g., humpback and gray whales, harbor and elephant seals, bottlenose dolphins, walruses, and sea lions, seem to co-exist well with human activities."

It is also difficult to assess the effects of a spill on the feeding success of a population of gray whales.

Certainly of major consequence to the species would be long-term effects of a localized spill on a major food resource. It is evident that major feeding for a large portion of the gray whale population may occur farther north in the Bering Sea. On a relative scale, a potential seasonal restriction to protect feeding areas is certainly of more significance in such areas. However, it is unlikely that a spill in the proposed sale 55 area would reduce the survivorship and productivity of the population as a whole via impact on feeding areas. It is known that a few gray whales may summer in the proposed sale 55 area, but a localized release of hydrocarbons would not likely impact food resources of significance to the entire population. Furthermore, to restrict drilling seasonally on the basis of protecting gray whales from contact with oil assumes the species cannot avoid oilspills and/or is extremely intolerant during these periods. There is little evidence to substantiate such assumptions, and it seems unreasonable to impose seasonal restrictions in light of the relatively low probability of disastrous spills.

Deletion of nearshore tracts may be as useful or more useful than seasonal drilling restrictions to afford protection to the species. A final point should also be borne out. At present, Endangered Species Act Section 7 Consultations are being completed. The Section 7 Consultation and information analysis associated with it will address the issue in detail.

Responses to the Whale Center.

1-3 We agree with your perspective and approach. Such a review of the nation's energy needs and attendant risks has already been done in the OCS programmatic FEIS. Please keep in mind that no one lease sale or oil field can supply all the nation's energy demands. Oil and gas must be produced from a wide variety of field sizes, both large and small, as long as they are commercial. Thus, even though sale 55 is not the largest, it is still worthy of exploration and commercial production if that should be the case.

4 U.S. energy supply is made possible by many energy developments which are often much smaller than the mean conditional energy resource development-Eastern Gulf of Alaska-presented in the EIS. If each of these is rejected because they involve environmental and economic costs then there will be no energy supply at all. Thus, the fact that the representative resource development considered may supply only 6 percent of U.S. consumption for one year is no reason to reject it. Instead, this suggests that it and all other energy projects must be weighted for economic and environmental desirability with many selected despite high costs or environmental impacts. Moreover, at the

present time we are so short of domestic energy that we can not meet our needs without conventional domestic petroleum development in addition to all the other energy sources including conservation. Thus, these sections show that serious alternative environmental impacts are implied by no sale.

5 A saving of 37 percent of foreign oil imports for one year is not a small matter. A saving of 1 percent of oil imports over 37 years might have considerable impact on foreign prices and the political actitities of foreign governments. This is especially true if it is noted that the proposal would, if it occurs, be combined with many other sources or savings in oil imports. The solutions to most economic problems are made by many small projects which cannot be rejected just because they are small. Thus, in each case, the project's import saving and other benefits must be weighted against its economic viability and environmental and social impacts. With direct reference to environmental impacts an increase of 1 percent in oil impacts over thirty seven years has serious alternative environmental implications which can not be dismissed as minor relative to eastern Gulf of Alaska impacts.

6 As noted above, if we combine all the likely sources of domestic energy including conservation measures we still need to engage in petroleum resource developments on a major scale in order to meet likely U.S. requirements. The fact that the resources from this sale are small relative to the national conservation potential in irrelevant since conservation and many smaller resource developments are both needed. Since many resource developments are needed the decision to stop one development implies starting another which may also have serious environmental problems.

7 You have made one basic assumption with your analysis which is questionable. You have assumed that sale 55's potential production should meet the entire productive capacity needed to supply the nation's energy demand. That is simply not so. The United States energy demand cannot be met by production from only one oilfield. It takes many oilfields from large to small to contribute the needed supply.

8 The variability of meteorological and oceanographic conditions is incorporated in the probabilistic aspect of the oilspill risk analysis.

9 You are correct in that the source of spilled oil in the marine environment is much greater from tanker accidents than from production platform problems. Insofar as the risk of seismic events causing oilspills, this is not necessarily so. For example, California has the same relative degree of seismic risk, yet it produces vast

quantities of oil onshore and offshore without damaging the environment. Secondly, the equipment that would be installed in a new area with high seismic risk would be designed for the most likely seismic events to occur in accordance with OCS Operating Orders and other regulations. And finally, common sense does not demonstrate that an earthquake, or even a totally collapsed production platform as a result of an earthquake, would result in a major oilspill. Such things as downhole blowout preventers and special values would automatically shut the producing wells in if such a calamity, in all its unlikelihood, were to occur. In fact, a number of platforms have cratered in the Gulf of Mexico without the big spill occurring. In conclusion then, although the probability of seismic events occurring in the Gulf of Alaska is high, it does not logically follow that the chances of an oilspill should be proportionately increased.

10 Your first sentence appears to be a rather bland assumption for which you do not offer any unquestionable, verified proof. You are correct in that the environmental assessments in the DEIS were made on available knowledge. As time passes, more knowledge will accrue to influence more detailed, future decisions by all concerned parties.

11 A closer examination of available information suggests that the "spectacular" number of harbor seals (2,500) found in Icy Bay is perhaps locally of significance, but represents a minor portion of the entire population. This does not imply that we are not concerned about the Icy Bay population, but is merely an attempt to add perspective. As discussed in our impacts discussion, the harbor seal is probably relatively tolerant of oil contact and is known to be tolerant of human activity. Please refer to our response to NOAA's Comment No. 46. Also, we have addressed Alternative V more thoroughly in the text.

We are not sure of your source regarding numbers of sea lion rookeries in the northeast Gulf of Alaska, but suggest the figure given (91) is inflated. Calkins and Pitcher define, in the 1977 OCSEAP Annual Report, a rookery as "any area where a large percentage of the sea lions present from the period of late May to early July are taking part in breeding and pupping". These areas considered rookeries are important for reproduction, as opposed to sites used only for temporary stopover and/or hauling out. Certainly rookeries are of most concern in OCS decisionmaking. Calkins and Pitcher (1977) indentified 11 major rookeries in the Gulf of Alaska, none of which are located in the northeastern gulf. The major concentration of sea lions nearest to the proposed sale 55 area is a hauling out location at Cape St. Elias. We have addressed your concern in this comment regarding cetaceans

in our response to Comments Nos. 15, 16, and 17 of the Cetacean Society.

12 Please refer to our response to Comment No. 20 of the Cetacean Society.

13 It is our belief that provisions under Section 7 of the Endangered Species Act and Consultation requirements under this Section will sufficiently address and identify needed information.

14 & 15 We agree with the general approach you suggest and would like to indicate to you that DOI has been doing just what you suggest. First, a new OCS programmatic FEIS has been recently published. This document reviews the environmental setting and potential, as well as alternative leasing areas both in Alaska and nationally with a view towards considering the most significant impacts to result from leasing in any given area. Thus, the comparative analysis you seek is readily available. Secondly, there has existed for quite some time a considerable effort in contracting for both appropriate natural science and socioeconomic studies along with scientific reviews and syntheses for all information prior to a leasing decision being made in any given area. Current technology is more than capable of working in the proposed lease and for sale 55. The industry can offer you a world of experience in many comparable areas to demonstrate the point. We do agree with you that wildlife studies are very important and germane to the nature of the OCS program in sale 55's area, as well as other areas.

2. Summary of the Yakutat Hearing and Testimony: The public hearing for proposed sale 55 as held in Yakutat on October 24, 1979. The purpose of the hearing was to receive views, comments, and suggestions relative to the draft environmental impact statement, including the proposed action and the alternatives. The testimonies from this public hearing are summarized below.

The Yakutat hearing was chaired by Esther C. Wunnicke, Manager, Alaska Outer Continental Shelf Office. Panel members were Gerald M. Reid, U.S. Fish and Wildlife Service, and Joe Jones, Geological Survey. Witnesses testifying were Larry E. Powell, Mayor of Yakutat; Ray Smith of Yakutat; and Jim Hart of ARCO Oil and Gas Company.

There was no opposition to the sale from the witnesses. As a matter of fact, the Mayor was very much in favor of proceeding with the sale as scheduled in October 1980. The Mayor supports community participation in servicing offshore oil and gas activities, but only to the extent that a majority of the labor force use local residents. A major concern expressed is the protection of natural resources and the surrounding environment.

The Mayor would also like to see further consideration of service vessel routing through commercial fishing areas. He favored of the recommended deletion of the tracts listed in the draft environmental impact statement.

There was a problem regarding the validity of the employment figures for Yakutat in the draft environmental impact statement. Also, a hybrid of the various alternatives offered was suggested for consideration.

Other concerns included potential impacts on fishing, hunting, and trapping caused by a major oilspill. Feeding grounds could be damaged, as tides and winds could carry a spill inshore and upstream.

A representative from ARCO commented that ARCO and the people of Yakutat worked together well in the past and pledged to do so in the future.

3. Summary of the Juneau Hearing and Testimony: The Juneau hearing for proposed sale 55 was held on October 26, 1979. This hearing was chaired by Donald Henninger, Chief, Environmental Assessment Division, Alaska Outer Continental Shelf Office. Panel members were Paul L. Lowry, Geological Survey, and Gerald M. Reid, U.S. Fish and Wildlife Service.

Witnesses testifying were W. J. Whaley, Alaska Oil and Gas Association, Exxon Company; William M. Meyers, Alaska Oil and Gas Association; C. Richard Knowles, Alaska Oil and Gas Association, ARCO; James Steger, Alaska Oil and Gas Association, ARCO; Sudie Burnham, Southeast Alaska Conservation Council, Inc.; Michael Macy, Friends of Glacier Bay; Julia Garling, Alaska Wilderness Expedition; John Chapman, National Park Service, Glacier Bay National Monument; Chip Thoma, Juneau; Larry E. Powell, Mayor of Yakutat; and James Kohler, City Manager of Yakutat.

AOGA repesentatives testified in favor of proceeding with the sale, as scheduled. Some of their testimony was based on the following issues:

--Sale 39 had positive impacts upon the city of Yakutat because of the high-capacity, high-quality water system that became available to augment the city's water supply.

--No incompatibility has occurred between the drilling industry and the fishing industry.

--Extreme measures are taken by oil companies in offshore drilling and producing operations to prevent oilspills. Although the probability of an oilspill occurring cannot be totally eliminated, industry has designed various oilspill response groups to provide the offshore petroleum operators with the capability of responding rapidly to a spill.

--AOGA presented the Nation's critical energy needs.

--AOGA presented a testimony on technology available for cleanup operations which have been formed by 12 oil companies.

Several conservation groups provided testimony based on protection of the ecosystems near the proposed lease area. These groups favored cancellation of the sale or a sale delay.

--Southeast Alaska Conservation Council, Inc. (SEACC) wants resources in this area to be managed a) to maintain opportunity for pursuit of traditional lifestyles; b) to maintain ecosystems as natural laboratories for

further research; c) to offer opportunities for low-impact recreation experiences; and d) to offer people economic development alternatives based on the low-impact exploitation of renewable resources. SEACC feels that oil and gas developments are not compatible with these objectives.

--SEACC is also concerned that earthquakes magnify the chance of a major oilspill reaching shore. They are opposed to construction and operation of a national gas pipeline along the Alsek Canyon. The group supports Alternative II, cancel the sale.

--Friends of Glacier Bay base their opposition on the bedrock concept outlined in the National Park Service Enabling Act of 1916, which states that natural areas in the National Park Service would be unimpaired for future generations. The group is concerned that oilspills and tanker traffic could affect the arctic loon and the gray whale. Wilderness values could be seriously threatened by a road and pipeline through the Alsek Canyon. The group supports Alternative II or III.

--Alaska Wilderness Expeditions are opposed to the sale mainly because of the proposed gasline through the Alsek Canyon. They feel that such construction would destroy wilderness values. The group recommends Alternative II.

--The National Park Service expressed concern about the proposed oil pipeline running from Pt. Manby to Icy Bay, as well as the gasline running through the Alsek River Canyon.

Other private citizens expressed opposition to the sale because of OCS development in the area of fish migration and feeding routes. Impacts on fishing, particularly salmon systems, as well as birds and nesting areas, are major concerns. A witness states that the draft environmental impact statement does not consider the threat of drilling operations to shipping traffic or the hazards that shipping poses to rigs.

--There was a disagreement over the economic and employment figures as stated in the draft environmental impact statement.

--Yakutat offered community support in servicing offshore oil and gas activities, but only where the labor force would use local residents.

The following written testimony has been included with this environmental impact statement because of its utility as referenced material.

FEDERAL COMMENTS

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

ALASKA OCS OFFICE
ANCHORAGE, ALASKA
OCT 9 12 PM '79

SEP 20 1979

Manager, Alaska OCS Office
Bureau of Land Management
P. O. Box 1159
Anchorage, Alaska 99510

Gentlemen:

This is in response to your request for comments on the Draft Environmental Statement concerning a proposed Outer Continental Shelf oil and gas lease sale (OCS Sale No. 55).

We have reviewed the statement and determined that the proposed action has no significant radiological health and safety impact, nor will it adversely affect any activities subject to regulation by the Nuclear Regulatory Commission. 1

Since we made no substantive comments, you need not send us the Final Environmental Statement when issued.

Thank you for providing us with the opportunity to review this Draft Environmental Statement.

Sincerely,

Wm. H. Regan, Jr., Acting Assistant Director
for Environmental Projects & Technology
Division of Site Safety and
Environmental Analysis

cc: Director (b42)
Bureau of Land Management
Washington, DC 20240

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

OCT 22 1979

ALASKA OCS OFFICE
ANCHORAGE, ALASKA
Oct 23 11 01 AM '79

Manager, Alaska OCS Office
Bureau of Land Management
P.O. Box 1159
Anchorage, Alaska 99510

Dear Sir:

We appreciate the opportunity to comment on the draft environmental impact statement (DEIS) evaluating the proposed Eastern Gulf of Alaska Outer Continental Shelf (OCS) Oil and Gas Lease Sale No. 55. The Federal Energy Regulatory Commission's (FERC) Office of Pipeline and Producer Regulation (OPPR) offers the following comments.

(1) On page 5, the DEIS indicates that an estimated peak daily quantity of between 110 and 374 billion cubic feet of gas could result from production in this lease area. These figures must be in error, since they are extremely high. For example, the proposed Alaska Natural Gas Transportation System (ANGTS) would initially transport only 2.4 billion cubic feet per day (Bcfd) of natural gas and would be capable of expanding to only 3.2 Bcfd. 1

(2) The statement on page 15 does not clearly describe the FERC's functions, particularly its OCS-related responsibilities. It would be more accurate to state that the FERC, within DOE, had conferred upon it under the Natural Gas Act the authority to issue certificates of public convenience and necessity for proposed projects involving the transportation or sale of natural gas in interstate commerce. All natural gas produced from the OCS is considered to be interstate and therefore is subject to FERC jurisdiction. The Natural Gas Act, the National Environmental Policy Act, and the OCS Lands Act Amendments of 1978 all grant authority or require that the FERC investigate the environmental effects of a proposed offshore project, as well as the potential gas reserves, the need for this gas, and the availability of capital to develop this resource. Also, the FERC is primarily responsible for administering 2

and enforcing compliance with the Natural Gas Policy Act (NGPA) of 1978 (29 Stat. 3350). As applied to OCS matters, the NGPA provides new wellhead pricing controls for certain natural gas.

(3) In the alternatives discussion of natural gas imports on page 42, the DEIS describes the past level of gas imports from Canada. More recent information indicates that on February 28, 1979, Canada's National Energy Board issued a report announcing a surplus of Canadian natural gas available for export. The FERC is presently analyzing a proposal to import Canadian gas in quantities up to 1.04 Bcfd. The gas would be delivered through the proposed early construction of the southern portion of the ANGTS. The gas covered by this import authorization would be the first new export of Canadian gas under other than emergency circumstances since 1970. The Commission is also reviewing competing applications for this proposed import of Canadian gas. 3

(4) The discussion of liquefied natural gas (LNG) imports on pages 42-43 should mention the operation of existing LNG import facilities at Everett, Massachusetts, Cove Point, Maryland, and Elba Island, Georgia. Future LNG projects include the approved construction of an LNG import terminal at Lake Charles, Louisiana, which is expected to begin receiving imported gas in the early 1980's. Also, on September 26, 1979, the Commission conditionally approved the construction of an LNG facility near Kenai, Alaska. This project would transport gas from fields in Cook Inlet to a proposed LNG plant in the Nikiski industrial complex in Alaska. LNG would then be transported by tanker and delivered to Point Conception, California, for regasification and sale to markets in southern California. 4

In considering LNG imports as a substitute for the proposed OCS sale, the DEIS appears to address LNG imports too negatively. The types of complexities and delays involved with the planning, approval, and construction of LNG import/export facilities are similar to the difficulties and delays encountered for any major energy project, including OCS development. LNG imports should be viewed as necessary supplements, not substitutes, for the development of our domestic gas programs. The advancement in recent years in LNG technology has been a much needed and timely development for obtaining additional gas for our nation. 5

The Commission is directing its attention and efforts toward regulatory actions to improve domestic natural gas supplies. The Commission staff recognizes the national importance of OCS exploration and development, as well as the need for effective environmental safeguards. Based upon a review of your DEIS, we believe that the proposed OCS oil and gas lease sale is in the national interest.

However, the potential for finding hydrocarbons in commercial quantities on the OCS off southeastern Alaska is poor. (See BLM's Draft Environmental Impact Statement: Proposed Five-Year OCS Oil and Gas Lease Schedule, March 1980-February 1985, p. 98.) The unsuccessful exploratory drilling under the previous lease sale in the northern Gulf of Alaska suggests that commercially significant quantities of hydrocarbons do not exist in this area. Concerning the potential for this proposed eastern Gulf of Alaska lease sale area, the DEIS states (page 3) that "there is a 95 percent probability that no commercial resources will be discovered." Additionally, the estimated quantities of oil and gas that could result from this proposed lease sale are low compared to other future scheduled lease areas. 5

There are many factors influencing the timing of OCS lease sales. For instance, sound energy policy calls for leasing and developing areas yielding greater economic benefits before developing less promising areas. Also, the timing of lease sales is influenced by the relative ranking of areas according to resource potential and industry interest in exploration. Industry ranks the Gulf of Alaska leasing area low in both these categories. (See appendix 2, DEIS: Proposed Five-Year OCS Oil and Gas Lease Schedule , , , .)

The DEIS does not adequately describe these factors, nor provide the rationale or justification for scheduling this particular lease sale at this time. The final environmental impact statement should address these issues and provide a discussion of how size, timing, and location were considered in developing this proposed lease sale.

Very truly yours,

Kenneth A. Williams, Acting Director
Office of Pipeline and Producer
Regulation

DEPARTMENT OF THE ARMY
ALASKA DISTRICT, CORPS OF ENGINEERS
P.O. BOX 7002
ANCHORAGE, ALASKA 99510

REPLY TO ATTENTION OF:

NPAEN-PL-EN

25 OCT 1979

Manager, Alaska OCS Office
Bureau of Land Management
P.O. Box 1159
Anchorage, Alaska 99510

Dear Sir:

The Alaska District, Corps of Engineers has reviewed the Draft Environmental Impact Statement (DEIS), Bureau of Land Management, Proposed OCS Oil and Gas Lease Sale No. 55, Eastern Gulf of Alaska, and offer the following comments for your consideration.

The nature of the project, the sensitivity of the impacted environment, and the possible extent of activities that are under Corps of Engineers authority require that the EIS assure the applicant(s) that little further information would be necessary for permit issuance. At this time, the EIS does not adequately discuss and evaluate the biological impacts which may occur due to the lease sale.

1 The subject DEIS does not appear to follow the new National Environmental Policy Act (NEPA) Regulations in either format or spirit. The spirit of the subject EIS is that of justification of the proposal rather than assessment of the environmental impacts. Examples of this can be seen on page 121, first paragraph which states 100 square km is a "relatively small size (compared to the whole Gulf of Alaska)." Page 143, first paragraph, "Sea otters may be reduced in numbers because of oil pollution, but this impact should not be significant."

2 3 Cumulative effects also include reasonably forseeable future actions which should be addressed in all portions where impacts are discussed. The list of preparers should include expertise and experience.

4

NPAEN-PL-EN
Manager, Alaska OCS Office

25 OCT 1979

We hope these comments will be of further assistance to you in the preparation of the final statement.

Sincerely,

Lee R. Nunn

LEE R. NUNN
Colonel, Corps of Engineers
District Engineer

CF:

Director (542)
Bureau of Land Management
Washington, D.C. 20240

United States Department of the Interior

HERITAGE CONSERVATION AND RECREATION SERVICE
WASHINGTON, D.C. 20240

IN REPLY REFER TO:

OCT 18 1979

Memorandum

To: Director, Bureau of Land Management

From: Director, Heritage Conservation and Recreation Service

Subject: Draft Environmental Statement for Proposed 1980 Outer Continental Shelf, Oil and Gas Lease Sale No. 55, Offshore Eastern Gulf of Alaska (DES-79/53)

We have reviewed the subject draft environmental statement and have the following comments:

Recreational Resources

1 We strongly oppose the proposed routing of the onshore gas pipeline through the Alsek Canyon. We feel that the DEIS should address alternate routes for this high impact construction scheme.

The impacts on this internationally significant river were not adequately addressed. The Alsek River originates in Canada and flows through Glacier Bay National Monument to the Gulf of Alaska at Dry Bay. The Alsek River was studied by our agency and the Canadian Government in 1979 and was found to meet the criteria for establishment as a wild and scenic river. Furthermore, the construction of a pipeline through a portion of Glacier Bay National Monument would be an instrusion on lands being studied for wilderness status.

2 The discussion of impacts on recreation and tourism beginning on page 162 suggests that the low level of recreational use will continue. We disagree. Observations in many remote areas of the State indicate increasing recreational use of rivers and national monument areas.

3 The paragraph addressing effects on recreational activities which the Alsek pipeline scheme would cause is misleading. The Alsek River is already a convenient transportation corridor for hunters and fishermen using riverboats and rafts. Road access which the pipeline project would bring is not needed for increased recreational use.

Cultural Resources

4 We are pleased to see a rather complete discussion of cultural resources in this statement, but we are concerned with the following issues.

5 In your discussion of the stipulation for protection of cultural resources during drilling operations, page 19, we would like to see a clarification of the expression "having reason to believe." Who will advise the area supervisor of the U.S. Geological Survey of the need to conduct remote sensing surveys?

6 We feel that the decision to conduct remote sensing surveys, on nearshore blocks only, appears to be arbitrary. We suggest that an evaluation of the medium probability areas be made to see if there is a need to survey them also.

7 We infer from your discussion about the five known ships of historical significance that these ships will not undergo a determination of effect in accordance with 36 CFR Part 800. We feel that these ships should receive the same treatment as terrestrial sites.

Harold Green
for Chris Therral Delaporte

United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VA. 22092

ALASKA OCS OFFICE
ANCHORAGE, ALASKA
NOV 13 3 23 PM '79

In Reply Refer To:
EGS-DES-79/53
Mail Stop 760

25 OCT 1979

Memorandum

To: Director (542), Bureau of Land Management

Through: Assistant Secretary--Energy and Minerals

OCT 31 1979

From: Director, Geological Survey

Subject: Review of draft environmental statement for OCS Oil and Gas Lease Sale No. 55, Offshore Eastern Gulf of Alaska

We have reviewed the draft statement as requested in your memorandum of August 31.

The low probability of finding recoverable oil and gas should receive more emphasis in the discussion of potential impacts. This increased emphasis should include making it clear that the statistical probability of oil spills is lower during exploration than during production.

These concerns and others are discussed in the enclosure.

J. R. Balsley
for H. William Menard

Enclosure

One Hundred Years of Earth Science in the Public Service

GENERAL COMMENTS

In spite of an early explanation of the basis for resource estimates in relation to impact evaluations (pages 3 and 4), this discussion appears potentially confusing to readers and further cautions appear to be advisable. For example, to state that "if oil and gas is discovered the 5 percent . . . level of recoverable oil and gas resources within the proposed lease area would probably be . . ." 800 million barrels of oil, may still suggest to many readers that the chance of discovering 800 million barrels of recoverable oil is 5 percent, whereas the actual change is evidently only about 0.25 percent.

Similarly, it may not be clear to readers that the "mean values" on which impact assessments are based throughout the EIS do not represent a 50-percent chance, as suggested by the term "mean," but only a 2.5-percent chance. Readers who are familiar with EIS's in general will probably be accustomed to assuming that implementation of the proposed action implies at least a 50-percent chance that the predicted impacts would actually occur, and in many cases a virtual certainty that the impacts would occur. If the level of conservatism represented by discussion of impacts that have no more than a 2.5-percent chance of actually occurring persists in the final environmental statement, the low probability deserves greater and more frequent emphasis in order to help forestall any misunderstanding. 1

The low statistical probability of an oil spill resulting from exploratory activities, as opposed to production, should be established in the analysis.

SPECIFIC COMMENTS

Pages viii-ix. The summary includes no mention of the significant fact that a 95-percent probability exists of discovering no commercial oil and gas resources as a result of the proposed sale (p. 3, par. 3, lines 1-2). This should be mentioned at the first reference to resource estimates or impacts. 2

Page viii, par. 2, line 4. The words "may contain" should be changed to "have a 5-percent probability of containing," according to information provided later (p. #3, par. 3). The same change is suggested for page 5 (par. 2, line 2) and page 52 (par. 3, line 2). 3

Page 2, sec. B, par. 2. The third sentence should read "Of the 76 leases issued in the northern Gulf of Alaska, 32 leases have been relinquished." 4

Page 5, par. 4. The following should be added at the end of the paragraph: "and only a 1-in-400 chance of discovering the specified amounts, based on facts known at present." 5

Page 6, par. 1. The following should be added at the end of the paragraph: "and the reader should bear in mind that this realistic or probable level does not have a 50-percent probability of occurring, but only a 2.5-percent probability of occurring, based on facts known at present." 6

Page 6, par. 2, last line. After "mean case" add in parentheses "(2.5-percent probability of occurring)." The same applies wherever "mean case" appears in the EIS. 7

Page 7, Mitigating Measures. The exploratory phase of OCS development and the USGS regulatory procedures, i.e., Application for Permit to Drill, deserve greater emphasis throughout this section. 8

Page 9, par. 2, line 3. This should read "provided to the Governor of those states." 9

Page 44, par. 5, lines 4-5. A reference is made to energy "estimated to be anticipated by this proposed action." This remark appears in need of qualification in view of the previously mentioned fact that the most probable anticipated energy production from the sale is none at all. 10

Table 1.B.2.a-1. The table heading indicates that it is based on anticipated production from proposed OCS Sale No. 55, and the first item shows equivalent production of ".45 x 10^9 barrels." The table is misleading unless appropriately qualified, because that amount of oil production would be anticipated to result from 20 lease sales like OCS Sale No. 55, according to the assumptions explained previously. "Unrisked mean resources," which appears in the table heading, should be defined where first used and should be qualified, as appropriate, if this term concerns probabilities. 11

Page 52, 4.a.; p. 59, 6.a.; tables 1.B.4.a.-1, 1.B.5.a.-1, and 1.B.6.a.-1. The 450 million barrels of oil and 1,250 billion cubic feet of gas are the mean estimates for all 350 blocks, not 289 or 218 blocks. 12

Pages 68, 90, 104. The source(s) of water supply should be given for Yakutat and Cordova and for the existing supply base at Yakutat in order to make assessment of potential impacts possible. 13

Page 93, par. 4, last line. The "stratigraphic hazards" have not been adequately defined or explained in the draft statement. 14

Pages 93-94, sec. b. Mention should be made of the Yakutat-Cape Suckling earthquake "window" for which area scientists are publicizing increasing strain concentratins and the possibility of a major earthquake. 15

Page 101, par. 1, lines 6-8. The resource estimates need to be qualified by adding: "if any are discovered (5-percent probability)." 16

Page 101, par. 1, last sentence. This should read "Undiscovered recoverable resources resulting from the proposed sale of 792,085 hectares . . . ." 17

Table III.A.1.d-1. Probability figures may be misunderstood to be actual probabilities of oil spills in the event that the sale is held as proposed, or in accord with the alternatives. The table should be qualified by adding "if oil is discovered in commercial quantities." Actual probabilities based on facts available now might also be shown, so that a probability of 0.047 would appear in an additional column alongside the theoretical probability of 0.94. 18

Page 112, par. 3. The spill frequency estimates should be qualified to indicate that the probability of four spills occurring under real circumstances now known is 0.0075 (not 0.15, as indicated). 19

Page 114, par. 3 and 4, and the 8 succeeding tables. Various probabilities have already been factored into the overall probabilities of oil spills. Consequently, it is not clear why the additional 5-percent probability of discovering commercial resources should not also be factored into the analysis in order to arrive at overall realistic figures for oil spills and environmental damage resulting from the proposed sale and its alternatives. We believe that this would be the information of most value to the reader or planner, and would preclude the need for frequent qualifications and explanations. 20

Figures III.A.2-1 to III.A.7-1. Several figures show circles in their legends, while several show bar scales. It would be preferable to use a single method of representation, and the bar scales should be checked for accuracy as they do not match the sizes of circles on the other legends. 21

Appendix A, page 1. We doubt the exclusive use of semi-submersible rigs. It would be more appropriate to say that floating drilling structures will be used and, in view of storm frequency in that area, dynamically positioned drill ships may be used. 22

Appendix B. In reference to the OCS Orders, no national orders will be issued. Orders for specific regional areas are now being revised and made final, with final revisions for the Gulf of Alaska area to be issued in the near future. Reference to USGS responsibilities and OCS Orders on page 15 and the analysis of orders in the appendices do not adequately cover USGS responsibilities. 23

Graphic No. 1, col. 2, par. 3. It is stated that "The stippled area on the above graphic shows the estimated extent of rupture area around the epicenter of the February 1979 earthquake." However, this stippling cannot be found on the map.] 24

Graphic No. 1, col. 5, par. 3. The legend refers to "Bedrock-mega sand waves," while the text refers to them as "bedforms;" possibly the legend is in error.] 25

Graphic 2. The plots for the directions of drift trajectories should be indicated.] 26

Graphic 9. It is indicated that archeological sites may, with a medium probability, exist in 101 blocks, with 25 blocks having high probability. Surprisingly, some medium probability sites are located in water depths of 125 meters, while some high probability blocks are located in water depths ranging from 50 to 75 meters. Considering the likelihood of glaciation, the low probability of survival of archeological sites along this high-energy submerging coastline, and the limitations of detection by remote sensing equipment, we believe the indicated high and medium probability of sites is not proper and, combined with the proposed archeological stipulation, will result in unnecessary surveys and studies. We are requesting the Area Geologist to review this situation and then meet with the Oil and Gas Supervisor and BLM/OCS to resolve this difference.] 27

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
P.O. Box 1628, Juneau, Alaska 99802

1950 '79

November 14, 1979

Ms. Esther Wunnicke
Manager, Outer Continental
Shelf Office
Bureau of Land Management
P. O. Box 1159
Anchorage, Alaska 99510

Dear Ms. Wunnicke:

Following are comments on the Alaska Outer Continental Shelf Office Oil and Gas Lease Sale No. 55, Draft Environmental Impact Statement (DEIS) dated August 31, 1979:

Pages 5-6: The estimated activity based on the mean scenario proposes an onshore oil terminal in Monti Bay, 16 kms. of 20-inch oil pipeline, and 240 kms. (150 miles) of 16-inch gas pipeline up the Alsek River Canyon to Haines Junction along with three booster stations in the canyon.

Based upon the Tongass Land Management Plan (TLMP) direction for this area in a LUD II, the adjacent Glacier Bay National Park, and recent interest in making the Alsek River an International Float River for high quality recreation and river floating experience, we feel that the construction of a pipeline, booster stations, road, bridges, etc., will reduce or eliminate this option. The Forest Service would recommend other alternatives that would not consider the Alsek River Canyon.] 1

Figure: 1.B.1.a.-1
1.B.4.a.1
1.B.5.a.1
1.B.6.a.-1

Shows Pt. Riou on Phipps Peninsula; should be the southernmost seaward point at Icy Bay.] 2

Pages 14-18: The land management authorities and responsibilities of the USDA Forest Service should be listed along with the USDI agencies.] 3

Pages 22-23: Add to list of impacts resulting from Alternative I:] 4

10. Effects of gas/oil pipeline construction to fish streams.

11. Effects of gas pipeline and related construction to wildland and float river experiences in Alsek River.

6200 (1-1-69)

Pages 22-27: The DEIS fails to recognize National Forest management and responsibilities and land allocations in TLMP for the lands outside the community of Yakutat and Native selections. If the project personnel are kept within an enclave as proposed, then little additional impact to National Forest resources and uses can be expected. In reality, however, this would appear to be difficult criteria to meet. The increase in people to Alaska and changes in community lifestyles as a result of the Alaska oil pipeline is probably more near the true situation.] 5

Page 65: The deer populations at Yakutat are so small as to be relatively insignificant.] 6

Page 66: Coyote, martin, and wolverine should be added.] 7

Page 82: The Chatham Area anticipates a significant growth in recreation use at Yakutat in relation to the present level. Use appears to be doubling on the Alsek River each year.] 8

Page 86: The record kill of 324 moose at Yakutat was not in 1979. Check with Alaska Department of Fish and Game (ADF&G) for correct date.] 9

Page 87: Discussions with Ron Ball, ADF&G biologist in Yakutat, do not agree with information presented on decline of brown bear. Suggest this be reconfirmed with ADF&G. No plans are known for total moratorium on brown bear hunting.] 10

Page 88: The section on wilderness should be completely rewritten. The TLMP Final Environmental Impact Statement and map and recent Congressional activity on Alaska lands legislation would better describe the wilderness situation for the Forest Service at Yakutat and the Park Service at Glacier Bay National Monument. The Situk Wild and Scenic River Study should also be discussed as it is included in both the Senate and House bills currently before Congress.] 11

Land status in Graphic No. 10 is in error. The Tongass Land Management Plan and BLM land transfer records at the State office in Anchorage should be reviewed. State land selections do not include the proposed Russell Fiord Wilderness Area or Situk River.] 12

Page 112: Situk Wild and Scenic River should be added to list as a part of Number 7.] 13

Pages 115-116: Earthquake hazard analysis should include the Alsek River Canyon to Haines Junction.] 14

It should be noted that little of the Yakutat Forelands is above the 30-meter figure mentioned in tsunami damage estimates.] 15

Page 124: Add Ahrnklin River to paragraph 2.] 16

Page 129: An oil spill causing a major loss of salmon would be more than a one-time loss. The effects could last for years and affect Yakutat's economic base.] 17

Pages 150-151: The enclave assumption is not believed to be workable, and additional people will follow the oil companies to Yakutat. The Tongass Forest would realistically anticipate increased use of Yakutat's natural resources and lands.] 18

Page 162: Last paragraph: Substitute "possible long-term" for "short term."] 19

Page 163: Do not agree with insignificant effects due to enclave assumption. Recreational use is expected to increase.] 20

Pages 165-166: The conclusions and cumulative effects appear to be more realistic but not in conformance with the previous enclave assumption.] 21

Pages 203-214: Alternative V should also consider an offshore gas pipeline and LNG plant in Icy Bay. This alternative appears to reduce most impacts and address the major issues. In reviewing the DEIS, it is difficult to understand why a modified Alternative V (including a LNG plant in Icy Bay) would not be the preferred alternative.] 22

Page 230: Paragraph 4: Suggest sentence including "ethnically diverse but initially sharing and accepting" be rewritten. Its meaning is unclear.] 23

Page 234: Add land otter and mink to sixth paragraph.] 24

We appreciate the opportunity to comment on this statement.] 25

Sincerely,

MICHAEL A. BARTON
Deputy Regional Forester

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

9 NOV 1979

OFFICE OF THE ADMINISTRATOR

Mr. Frank Gregg
Director
Bureau of Land Management
Department of the Interior
Washington, D.C. 20240

Dear Mr. Gregg:

The Environmental Protection Agency (EPA), in accordance with its responsibilities under the National Environmental Policy Act and Section 309 of the Clean Air Act, has reviewed the draft environmental impact statement (EIS) on the Proposed Outer Continental Shelf Oil and Gas Lease Sale - Eastern Gulf of Alaska (OCS #55).

The Statement contemplates the sale of 350 lease tracts for oil and gas development offshore Alaska, and six alternatives involving tract deletions, alternate pipeline routes, sale delay, and sale cancellation. The sale is proposed to be held in October 1980.

As you know, EPA has serious environmental reservations concerning the continuing sale of deepwater tracts, especially if it is stipulated that tract development is likely to be by means of subsea completion and production technology. (Alternative VI projects as the likely development mode the utilization of two floating platforms and seventy subsea completions). We continue to believe that tracts requiring subsea technology should not be offered until relevant regulatory controls are established. We again urge the Department to commence an evaluation of the environmental vulnerability of subsea technology, and to formulate relevant standards and controls for continued safe operation and contingency measures. This seems especially important for Sale 55 because of the severe geologic hazards of this area. 1

In our review of the statement, we have identified a number of areas for which we believe more information is necessary or where analytical emphasis should be redirected. Overall, we believe that the statement has tended to focus too much on the developmental rather than on the exploratory impacts. The analysis in this EIS should emphasize exploratory impacts as these relate to the issues that are germane to decision-making at the pre-sale stage. The subsequent EIS for field development, should and could more accurately discuss the specifics of development-oriented impacts. At this later date potential reserves will have been more accurately defined and development facilities realistically planned. 2

We recognize that many of the information problems in the statement relate to the fact that a number of the site specific studies relevant to the Sale #55 area are not yet completed. For example, the analysis of studies on geotechnical properties of sediments and sediment stability will not be completed until the summer of 1980. Also, the physical oceanography work for the area is still being analyzed and new oil spill trajectories based on this data (rather than Sale #39 data) will not be available until the end of 1979. With regard to biological data, a survey of benthic biota is scheduled for November 1979. In addition, the results of a series of seasonal surveys to determine seasonal densities and distributions of different fish species should be available by early 1981. Reconnaissance surveys of bird use of coastal habitats are also scheduled for this fiscal year. We believe the information from these studies could be significant and urge you to consider obtaining this information before finalizing a Sale decision and management options. 3

Other information which we believe should be more thoroughly considered in the final statement (and may, to some extent, also be dependent on obtaining information from as yet uncompleted OCSEAP studies) are: 1) oil spill risk analyses that consider the seismic hazards of the sale area, 2) oil spill risk analyses that put appropriate emphasis on the inability to contain and remove spilled oil in the sale area waters, 3) a description of the technology that will be used to overcome the vulnerability of subsea completions and pipelines to seismic disruptions, 4) draft stipulations that will be appended to leases to protect unique biologic resources of the area, and 5) the aspects of EPA's authorities that are relevant to the control of offshore discharges of pollutants. It would also be helpful if a tract listing were included that showed tract depth and distance from shore. 4

In accordance with our system for rating environmental impact statements, we have categorized this EIS as ER-2 (Environmental Reservations - Insufficient Information). We appreciate the opportunity to review this Statement and hope our comments will assist in the formulation of the final statement. 5

Sincerely yours,

William N. Hedeman, Director
Office of Environmental Review (A-104)

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230
(202) 377-4335

November 9, 1979

Manager
Alaska OCS Office
Bureau of Land Management
P. O. Box 1159
Anchorage, Alaska 99510

Dear Sir:

This is in reference to your draft environmental impact statement entitled "Eastern Gulf of Alaska, Sale No. 55." The enclosed comments from the National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS) and Environmental Research Laboratories (ERL) are forwarded for your consideration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving 12 (twelve) copies of the final statement.

Sincerely,

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosures: Memo from James W. Rote, NOAA/NMFS
Memo from D.A. Wolfe, NOAA/ERL
Memo from Marcia C. Glendening, NOAA/ERL

CC: Director (542), Bureau of Land Management,
Washington, D.C. 20240

Rec'd PP/EC
OCT 12 1979

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
ENVIRONMENTAL RESEARCH LABORATORIES
Pacific Marine Environmental Laboratory

Date: October 9, 1979

To: PP/EC - Richard L. Lehman

From: RD/RF28 - Marcia C. Glendening

Subject: Comments on DEIS 7909.13 -- Eastern Gulf of Alaska Sale No. 55

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ALASKA OCS OFFICE
ANCHORAGE, ALASKA

Comments on Graphic No. 2 --
Meteorological Conditions and Physical Oceanography

Circulation: 1) Although Royer (1978) may be correct in correlating the seasonal circulation with rainfall, wind forcing plays a much more important role on the event (2-10 days) time scale (Hayes and Schumacher, 1976; Hayes, 1979). Since oil spills occur on the event time scale wind-driven currents are an important consideration. 1

2) The shelf break currents have been shown by buoy trajectories, deep current meters near Icy Bay, and satellite observations to meander and contain eddies. As mentioned in the DEIS these features may result in a low mean flow (long residence time) in the region and hence significantly affect pollutant impact.

Rec'd PP/EC
06 NOV 1979

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Washington, D.C. 20235

06 NOV 1979

NOV 13 9 55 AM '79
ALASKA OCS OFFICE
ANCHORAGE, ALASKA

TO: PP/EC - Dr. Richard L. Lehman

FROM: F7 - James W. Rote

SUBJECT: Comments on DEIS No. 7909.13 - Eastern Gulf of Alaska Sale No. 55

The Draft Environmental Impact Statement (DEIS) for the Proposed Outer Continental Shelf Oil and Gas Lease Sale, Eastern Gulf of Alaska was obtained for review from the U.S. Department of the Interior, Bureau of Land Management. We have reviewed the DEIS and offer the following comments:

GENERAL COMMENTS

We find that the DEIS neither presents the full range of possible alternatives nor adequately discusses all major adverse impacts to the resources under our purview. Therefore, we recommend that the document be revised substantially to reflect the requirements of 40 CFR Parts 1500-1508, "Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act." Specifically we believe that the final EIS needs to offer a broader range of alternatives including both onshore and offshore oil terminals and an LNG plant or pipeline for each alternative presented as required under the Regulations. In any alternative, particular attention should be given to the "Cumulative Impact" (1508.7) and "Effects" (1508.8) insofar as practicable. 2

Along the coastline of the northeastern Gulf of Alaska, productive intertidal and wetland ecosystems in sheltered bay areas are limited. These areas provide high biomass production and species diversity in comparison to other habitat types (SAI, 1978). The limited availability of these habitats increases the importance of the Yakutat Bay and Icy Bay environments. The DEIS does not delineate the acreage of intertidal and wetland areas in either bay which could become impacted by spilled oil. It also overlooks the anticipated oil terminal (and possible LNG plant) construction activities, such as landfilling and dredging, which would be detrimental to the marine environment. Thus, it is not possible for a reviewer to compare the biological merits of the Yakutat site against the Icy Bay site. 3

The DEIS does not recognize the crucial value of all nearshore, intertidal, and wetland habitat in the overall production of marine biomass. These areas can be severely impacted by direct exposure to an oil slick itself, and from water soluble and aromatic fractions. When considering equal volume oil spills, offshore versus nearshore, we believe that an offshore spill usually will be less damaging to marine productivity. 4

The evaluation of an oil spill emanating from any of the three offshore sites indicates that they would have roughly the same adverse impacts on the marine environment. Information to support such a judgement has not been provided. The final EIS should also address the problem of disposing of the ballast water from ships onloading crude oil. Additionally, the final EIS should evaluate whether locating an oil loading facility offshore would make the possibility of a catastrophic oil spill significantly greater than for an onshore site. 5

The final EIS should mention that the adverse effects of oil pollution often appear indirectly through bio-accumulation. Oil can enter marine food webs through algae and filter feeding organisms where it can accumulate to toxic levels or taint the flesh of higher order consumers (SAI, 1978). 6

The final EIS also should discuss the impacts of oil development to important sportfishes of the eastern Gulf of Alaska, such as the steelhead (Salmo gairdneri), the sea-run cutthroat trout (Salmo clarki), and the Dolly Varden char (Salvelinus malma) (Vol. III, Graphic No. 4). All three species spend part of their life cycles in the marine environment and could be adversely impacted by oil pollution. 7

Additional knowledge must be obtained on the importance of the sale area to endangered whales and other marine mammals. Current information is insufficient to formulate guidelines to provide adequate protection for these species. 8

We are pleased to note that the recommendations for block deletions submitted previously by NMFS and the International Pacific Halibut Commission (IPHC) have either been adopted or lie outside of the sale area. 9

Buried pipelines would lessen impacts to, and arising from, commercial fishing. Therefore, we recommend a full discussion of various alternatives which would require that pipelines and other subsurface structures be buried or otherwise protected (e.g., by "shrouds"?) to avoid snagging or otherwise damaging fishing gear. 10

The summaries (lists) of probable impacts for alternatives I, III, IV, V, and VI should categorize the impacts to commercial and recreational fisheries separately. These resources merit specific attention. The commercial fisheries of the eastern Gulf of Alaska are utilized by domestic fishermen from many areas within the United States. Also, foreign fleets extensively harvest the area's bottomfish. Marked salmon recaptures indicate that both wild and hatchery stocks of chinook and perhaps a few coho originating in British Columbia, Washington, and Oregon utilize the area. Therefore, adverse fisheries impacts could 11

have interstate and international political ramifications that should be recognized and described in the final EIS.

SPECIFIC COMMENTS

VOLUME I

I. ALTERNATIVES INCLUDING PROPOSED ACTION
B. Analysis of the Proposal and Its Alternatives
1. Alternative I - Proposed Action
b. Mitigating Measures Included in Proposed Action
Stipulation for Wells and Pipelines

Page 21, para. 3 and 4. We are unfamiliar with the design and efficiency of shrouds and have been unable to locate such information. We, therefore, request that the final EIS provide information and cite studies pertaining to the value of shrouds as a mitigation measure. 12

c. Summary of Probable Impacts

Page 25, para. 3. The final EIS should define what size of a spill will constitute an adverse event. The statement that "Adverse events would probably only occur in 1 year during the project..." appears to be contradictory to the probability curves in Figure III.A.1.d-7. Also, halibut, other flatfish, and many bottomfish have planktonic eggs and larvae which would be susceptible to oil pollution. The eggs generally float at or near the surface and the early larvae also remain in surface waters. Herring are intertidal spawners whose eggs and larvae would be impacted by an oil spill. (These comments also apply to page 49, para. 3.) 13

Page 25, para. 4. The contents of this paragraph do not appear to be related to the discussion of impacts attributable to Sale No. 55. Also, the prevailing Alaskan current in the Yakutat area moves northwesterly along the coastline; buoys released in this area have been recovered in Prince William Sound (SAI, 1978). (This comment also applies to page 49, para. 5.) 14

Page 25, para. 5. The meaning of this sentance is unclear and it appears to be out of context (i.e. "these shellfish species" are not previously discussed). Commercial scallop and subsistence clam and (Yakutat Bay) pink shrimp fisheries need to be recognized and discussed in this section. 15

Page 25, para. 6. Potential impacts of a major oil pollution event on the four salmon species other than pink salmon could be of greater significance than implied here. Chum salmon commonly spawn in intertidal areas where oil could come into direct contact with incubating eggs. Chum fry develop in nearshore areas, and juvenile chinook, coho, and sockeye salmon also utilize this habitat. Morrow (1973) showed oil to be lethal to juvenile coho and sockeye; thus, the presence of oil during outmigration should be considered very detrimental. Adults of all species school in nearshore areas in preparation for spawning runs, and an oil spill at this time could also be very detrimental. (These comments also apply to page 50, para. 1.) 16

Page 25, para. 7. The final EIS should justify the rationale behind the 100,000 to 200,000 range for loss of pink salmon. It should also explain whether this loss refers to pink salmon fry or to adult fish entering the commercial fishery during the years following the worst case event. (This comment also applies to page 50, para. 2.) 17

3. Alternative III - Delay the Sale
b. Summary of Probable Impacts

Page 48. It should be noted that a delay may allow future advancements in technology to improve upon methods for detection of oil and gas reserves, thereby reducing some of the uncertainty that exists in this proposed sale and some of the impacts from exploratory and production activities (page 182, para. 3). It could also be noted that delaying the sale would allow completion of ongoing and planned studies coordinated by the Outer Continental Shelf Environmental Assessment Program (OCSEAP) that would provide area-specific environmental information that could then be used in planning and in the evaluation of potential impacts. Of particular importance are the studies on the habitat use of the lease area by cetaceans, especially endangered species of whales, that are to begin in FY 1980 (page 98, para. 1). 18

Page 49, para. 4. The location of this paragraph in the text implies that only those fish species described in the preceding paragraph will be adversely affected. In actuality, all of the commercially important fishes and shellfishes of the area could be affected. It should also be noted that just one bad year class can adversely affect catches for many succeeding years. Also, the statement "....but would probably not be measurable in the commerical fishery" needs to be qualified. Does the statement refer to state-wide or local fisheries? What references were used to draw this conclusion? What species are involved? 19

6. Alternative VI - Modify the Sale by Deletion of the Nearshore and Northwest Portion with an Offshore Marine Loading Terminal.
b. Summary of Probable Impacts

Page 60, para. 5. It should also be noted that deletion of the northwestern blocks would result in a reduction of impacts to halibut, Tanner crab, and bottomfish habitat (Vol. III, Graphic No. 4). Additionally, impacts on the high relative abundance of invertebrates (Vol. III, Graphic No. 3) would be reduced. 20

C. Discussion of the Comparative Analysis of Impacts and Alternatives. Table I.C. -1, Environmental Impact Comparative Analysis.
Key Scoping Issues

Alternative V. In our opinion, the impacts to the commercial fisheries should be changed from "insignificant" to "minor". Shifting the onshore loading facility to Icy Bay would not reduce the possible adverse impacts from the offshore oil field. 21

Constant Impact Issues, Ecological Impacts

Alternative V. In our opinion, impacts to seals should be considered "moderate" due to the high density harbor seal population in Icy Bay. 22

III. ENVIRONMENTAL CONSEQUENCES
A. Environmental Impacts of the Alternatives Including Proposal
2. Alternative I - Proposed Action
a. Impacts on the Biological Characteristics of the Affected Environment
Impacts on Fish Resources

Page 120, para. 4. We suggest deleting the word "only" from the statement " . . . a total of only about 450 million barrels . . . would be discharged over a 25-year period." 23

Page 120, para. 5. If a yearly average of 45,000 barrels of oil from tanker accidents is indeed expected, then it should be discussed as a major adverse impact. 24

Page 127, para. 5. Yakutat Bay harbors the major known herring spawning areas in the eastern Gulf of Alaska (SAI, 1978). Thus, a spill there would probably affect practically the entire eastern Gulf herring population. Herring is a major forage species for some of the commercially important fishes and marine mammals of the area. Also, a lucrative commercial fishery exists in the Gulf for herring eggs on kelp and sac roe. 25

Page 127, para. 6. Indicating the size of this "1 large" spill would be helpful as the probability curves for greater than 1,000-barrel spills indicate the likelihoood of more than one such spill occurring. 26

Page 129, para. 5. The action alternatives all estimate that 70 production and service wells could be in operation. Thus, the chance of a blowout would seem to be 1 in 40 rather than 1 in 400. We also question the validity of the 100,000 to 200,000 range for lost fish. The result of a hypothetical poor production year could result in the complete closure of the pink salmon fishery in the Yakutat area for the affected year class. Returning adult salmon during the spill year could become oil-tainted, thus causing two successively poor years for this fishery. A poor year class could also be expected to have adverse repercussions on alternate pink salmon runs in the immediate future. 27

Page 131, para. 2. If crab larvae are all along the Yakutat coast and an oil spill covers one-half of the coastal area, then it appears that one-half of the crab larvae could be lost; perhaps even more could be lost due to currents and wind circulation. Further studies are necessary to define this potential impact of the proposed sale. 28

4. Alternative III - Delay of Sale
a. Impacts on the Biological Characteristics of the Affected Environment
Impacts on Commercial Fishing

Page 182. If technological advances do lead to a better ability to detect petroleum resources, then the adverse impacts stemming from petroleum exploratory operation should be reduced. Similarly, increased knowledge of important fish habitat and migration routes may result in the deletion of crucial tracts, thereby protecting these valuable resources and reducing impacts to fisheries. 29

7. Alternative VI - Modify the Sale by Deletion of the Nearshore and Northwest Portions with an Offshore Marine Loading Terminal
a. Impacts on the Biological Characteristics of the Affected Environment
Impacts on Marine Habitats and Food Web Resources

Page 215, para. 6. Deleting the outer shelf blocks would significantly reduce the size of the proposed sale area. Impacts to marine organisms from drilling activities, pipelines, spills, and blowouts from within the deleted area would be completely avoided. 30

Impacts on Commercial Fisheries

Page 217, para. 2. In our opinion, interference with the offshore commercial fisheries for halibut and bottomfish would be significantly reduced if the northwest portion of the proposed sale area were deleted. 31

E. Impact of the Maximum Development Scenario

Page 235, para. 2. Assuming oil and gas production, we suggest that the final EIS also give the blowout risks for the 70 production and service wells expected to be drilled between 1987 and 1991. 32

Conclusion

Page 238, para. 7. We assume that the 100,000 to 200,000 range refers to lost pink salmon (fry or adults?) and again question the validity of these figures. 33

V. CONSULTATION AND COORDINATION
A. Results of the Scoping Process for Proposed OCS Sale No. 55

Page 245, para. 6. The ACMP was approved by the Secretary of Commerce in July 1979, contrary to the statement here that "The State's CZM plan has still not been formally accepted by the Federal government." 34

We would appreciate receiving two copies of the final EIS.

Literature Cited

Morrow, J., 1973. Effects of crude oil and some of its components on young coho and sockeye salmon. EPA-660/-3-73-018. 37 p.

Rice, S. D., and J. Karinen, 1976. Acute and chronic toxicity, uptake and depuration, and sublethal metabolic response of Alaskan marine organisms to petroleum hydrocarbons. Quarterly Report, OCSEAP Research Units #72/331/334. 14 p.

Science Applications, Inc. (SAI), 1978. Interim environmental synthesis of the northwest Gulf of Alaska: a report based on NOAA/OCSEAP synthesis meeting, Jan. 11-13, 1977, Anchorage, Alaska. 199 p.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
ENVIRONMENTAL RESEARCH LABORATORIES
Boulder, Colorado 80303

ALASKA OCS OFFICE
NOV 13 9 56 AM '79

DATE: OCT 11 1979

TO: PP/EC - Richard L. Lehman

FROM: RD/RX4 - K. A. Wolfe

SUBJECT: Review of DES 7909.13 - GOA Sale 55

Attached are OCSEAP's comments.

- END -

Enclosure

cc: Swanson
Ehler CZM-ORCA
Bruce
Weller

COMMENTS ON DES 7909.13 GOA Sale 55

OUTER CONTINENTAL SHELF
ENVIRONMENTAL ASSESSMENT PROGRAM

I. Recommendations on Alternatives

OCSEAP recommends that Sale 55 be delayed by one year - till October 1981 - to allow for the generation and evaluation of adequate environmental information on the proposed sale area. Environmental studies were initiated in this area only in FY 79, as the area first appeared on the lease schedule after planning for FY 78 studies had already been completed. In addition, many new studies planned for FY 79 could not be implemented because of last-minute budget cuts by BLM. The present DEIS therefore relies heavily on environmental information generated for the previous GOA Sale 39. A one-year delay of the sale would greatly improve the evaluation of potential impacts by making available the area-specific FY 79 and FY 80 study results to the FES, and permitting design of topical studies for special problems in FY 81, just prior to the sale. 35

II. General Comments on DES

The DES was evaluated primarily with respect to the following criteria:

- .Adequacy of the characterization of regional features (geology, physical oceanography, biota).
- .Technical accuracy of scientific information.
- .Whether scientific information is complete.
- .Organization and inter-disciplinary integration of information (especially that pertaining to vulnerability of biota to insults and potential impacts).
- .Information content and technical accuracy of graphics and accompanying text.

The paragraphs that follow represent a distillation of a large number of more detailed comments by disciplinary specialists and thus address mainly recurring points rather than details.

A. Issue: Development constraints due to geohazards

The DEIS does not make the point that there was virtually no geohazards data available from the Sale 55 area at the time the document was written 36

and that most of conclusions are based on work performed in the Sale 39 area to the west. There is no mention of intensive surveys now underway to fill data gaps.

The proposed action and alternatives do not consider all impacts. The potential geologic hazards to the gas pipeline up the Alsek River are not discussed. Alternative V does not consider potential hazards associated with a submarine pipeline to Malaspina Foreland and onshore across the Foreland to Icy Bay, or the probable frequent dredging of Icy Bay terminal site that will be required due to rapid siltation of the bay. 37

Alternative III does not consider the mitigating effects that will accrue vis-a-vis the additional geohazards data that will be available from ongoing OCSEAP research if the sale is delayed. It is likely that the analyses of field data collected during the summer of 1980 will not be completed until after the current sale date. 38

B. Issue: Potential impacts of OCS development on marine birds, shorebirds and waterfowl

The DEIS is weak in putting into perspective the characteristics of the regional avifauna and their habitat use. For example, it is not made evident that the Sale 55 area is a minor seabird breeding area in comparison to other parts of the Gulf of Alaska, or even the western part of the NEGOA call area. It does not indicate that the coastline from Cape Suckling to Icy Point has relatively few bays or estuaries that can provide shelter or foraging opportunities for marine birds and thus the probable singular importance of those habitats to migrating or wintering birds. 39

The adequacy of the current information base, data gaps and ongoing or proposed research to fill gaps are not considered. Available data are not used in many cases. 40

The discussion of the potential impacts on marine birds presents a picture of gross damage to populations without adequately defining the conditions of insult, thus the conclusions that follow often refute the preceding rationale. 41

Alternative III does not include the potential mitigating effects that the results of planned OCSEAP research may furnish. A delay of sale will give decision-makers an improved information base for evaluating potential effects of oil spills and development on birds and their coastal habitats. In addition, the information will form a basis for developing well-founded stipulations to minimize impacts. 42

C. Issue: Potential impacts on marine mammals (excluding endangered species) from the OCS activities

The DEIS discussion does not adequately reflect the relative importance of the Sale 55 area to marine mammals populations in comparison to other 43

parts of the Gulf of Alaska. For example, there are no major sea lion rookeries in the region, but this is not stated. The importance of Icy Bay for harbor seal pupping is not evident. The paucity of sea otters near Yakutat, as compared to west of Kayak Island, is not made explicit.

Available information is not always included, as, for example, in the marine mammals graphic and accompanying text (Volumes I and III), which do not cover the fur seal, an animal of economic importance that is vulnerable to oil spills, abundant and certainly present at times in the Sale 55 Area. 44

As with the preceding issues, the available information base is inadequately described, thus it is often not possible to separate statements that may be speculative from those that are well-founded. 45

Alternative V states that harbor seals in Icy Bay might be affected if a facility is located there, but offers no elaboration as regards the character or degree of potential impacts. 46

D. Issue: Potential impacts to commercial fisheries as a consequence of OCS development in the Yakutat region

It would be useful to compare the species catches in the Yakutat region with those in other parts of the Gulf of Alaska or with the Gulf as a whole to indicate Yakutat's contribution to the entire Gulf catch - again to offer perspective on the relative importance of the various fisheries. Again, there is insufficient evaluation of the available information base or identification of data gaps. 47

The discussion of impacts on fisheries must make clear the distinction between stocks and populations. Furthermore, it should attempt to identify species for which stocks are mixed in the Sale area and/or highly migratory, as these factors can result in radically different impacts. For example, in the case of juvenile salmon the issue of impacts of spilled oil on subsequent recruitment is very involved as the young salmon passing through the sale area are comprised of locally produced fish as well as those derived from population units from other geographic regions. Thus, supposing an offshore oil spill caused local mortalities of young salmon, the impact of such an event could affect recruitment to both local and distant fisheries. The cost-benefit considerations for an impact spread among several stocks may be considerably different than for one affecting a particular stock or population. 48

As with the other evaluations of effects of activities on resources, the rationales preceeding the conclusions lacks specificity and thus the conclusions tend to refute them. In particular, it appears that little use has been made of information obtained by OCSEAP investigators studying effects of petroleum on marine organisms. 49

The DEIS does not describe planned research to address information gaps on epipelagic early life history stages of commercial species in the planned sale area or how delay of sale (Alternative III) would possibly mitigate potential impacts due to the availability of this information to decision-makers. 50

E. Issue: Potential impacts on endangered and threatened species due OCS development in the Yakutat area

The DEIS considers several species of whales and two species of birds to be at risk. The "worst case" analysis of impacts on whales is much less credible than one based on a careful evaluation of the available information on actual sightings in the area, natural history data and potential vulnerability to insult-the former echos the "high find" impact assessments employed in past EISs. An analysis of available information on species ranges, behavior, etc. would probably make it evident that the likelihood of impact would be vanishingly small for many whales (e.g. pelagic species). The species most likely to be impacted the Sale 55 area are probably grey and humpback whales, although this is not noted in the DEIS. Also, it seems counterproductive to include observations on species not found in the Sale 55 area (i.e. bowhead whales) as illustrative of possible effects on species present there due to probable inter-species differences in responses to disturbance or oil. 51

The DEIS does not provide an evaluation of the available information base from the sale area and omits some recent studies (e.g. Braham's review of marine mammals for OCSEAP and sighting data from the southern Alaska troll logbooks program). 52

Alternative III (delay sale) does not note the possibility of improved assessment of impacts resulting from additional information available to decisionmakers at some future date. 53

F. Issue: Potential impacts on marine habitats and food web resources due to OCS development in the Yakutat area

This is a catch all issue to cover important species or habitats that are not of commercial, recreation, asthetic or legislated concern, but may contribute to the health and well being of the regional ecosystem and its "key" species. 54

As with the above issues, no data evaluation or identification of information gaps is evident. Much of the material presented is based on the results of OCSEAP studies west of the Sale 55 area. 55

A regional perspective is lacking. The text of Volume III does not convey the fact that the coastline between Kayak Island and Icy Cape is predominantly a high energy environment dominated by sand and gravel substrate and relatively impoverished intertidal communities-in contrast 56

to the Prince William Sound - Copper River delta region to the west, which has more sheltered mud and bedrock beaches that support much richer and more diverse biotic communities. Relatively few of the findings resulting from Feder's extensive investigations on shelf benthos are evident in the text of graphic of Volume III (e.g. the conclusions that sedimentation rates are instrumental in controlling benthic community composition and that there are gradations between the dominant communities rather than sharp demarkations. The discussion of beach susceptibility doesn't make the point that relatively little high risk coastline exists near the Sale 55 area and that the bulk of such coastline in the northern Gulf is in the Copper-Bering River are some distance westward. 57

Planned or ongoing OCSEAP studies to fill information gaps (e.g. benthos reconnaissance, shelf and inshore circulation patterns) are not mentioned. Alternative III (delay of sale) does not note the potential for improved risk and impact assessment resulting from the availability of such information. 58

G. Issue: Transport of contaminants in the Yakutat area

The DEIS does not offer an evaluation of the available data used for the discussion of regional circulation and oil spill trajectory calculations, thus it is not evident that most of the results presented are based on observations from west of the Sale 55 Area. 59

The discussion on circulation features of the region could benefit from the presentation-with appropriate caveats-of results of studies in the Sale 39 area to the west. These studies showed that the shelf currents generally are aligned with isobaths; that the mean flow is on the order of 10cm/sec; that currents attributable to meterological events may be somewhat greater than the mean flow but don't exceed 55 cm/sec; that there is as yet poorly understood coastal jet having speeds up to 100 cm/sec; and, finally, that the Alaskan Stream is an important influence on shelf circulation vis-a-vis the introduction of meanders and eddies that perturb the wind-driven circulation to some extent and are manifested as locally increased flows which may be counter to the mean currents. 60

Alternative III (delay the sale) did not consider the potential improvement in assessment of impacts to habitats and populations that should result from ongoing shelf circulation and oil spill trajectory modelling and planned inshore circulation investigations. Some results of the former investigation should be available by early 1980. The latter study won't be initiated until probably mid-1980, thus those results won't be available prior to the sale. 61

General Comments

The more streamlined organization and content of the DEIS make it easy to access and more comprehendable that the previous versions. However,

it could benefit from some editoral devices to make major points stand out (different type, type size, etc.). Also, in the alternatives sections, it would appear that in cases where impacts were similar (e.g., impacts listed as subcategories of Biological Characteristics of Affected Environment), a single sentence or paragraph covering all would suffice rather that stating each separately. This would serve further to streamline the DEIS. 62

ALASKA OCS OFFICE
ANCHORAGE, ALASKA
JAN 3 9 11 AM '80

United States Department of the Interior

NATIONAL PARK SERVICE
WASHINGTON, D.C. 20240

IN REPLY REFER TO:

L7619(135)

DEC 5 1979

Memorandum

To: Director, Bureau of Land Management
Attention: William Van Horn

From: Acting Director, National Park Service

Subject: Review of the Draft Environmental Impact Statement for the Proposed Oil and Gas Lease Sale No. 55, Outer Continental Shelf, Eastern Gulf of Alaska (DES 79-53)

The Bureau of Land Management, OCS draft environmental impact statement for the proposed joint Federal/State leasing action in the eastern Gulf of Alaska has been received and we are pleased to provide the following comments:

BACKGROUND

Three hundred and fifty blocks totalling 792,085 hectares (1,952,252 acres) of outer continental shelf lands are proposed for oil and gas leasing action. The tracts extend from south and east of Yakutat along the territorial boundary and generally seaward from the coast to the 300-meter isobath. If implemented, this action would permanently impact the scenic and ecological values of Glacier Bay and the Wrangell-St. Elias National Monuments.

Glacier Bay National Monument with its recent addition lies near the southeastern extreme of the proposed lease sale site, and Wrangell-St. Elias National Monument lies near the northwestern limit of the proposal. Apparently the DEIS was written under the assumption that these two Park Service administered areas were still in the proposal stage; whereas they were established as national monuments on December 1, 1978. It is important that this fact be recognized in the report. It has been pointed out under the section SPECIFIC COMMENTS.

GENERAL COMMENTS

There are six alternatives presented, ranging from no sale to various modified alternatives, with alternative number one outlining the proposed action and alternative number two describing the no sale scenario.

Voice of the Visitor

The remaining four alternatives consider various degrees of development of oil and gas resources that might be found resulting from the proposed lease sale. One considers a 16-inch gas pipeline, service road and attendant structure to be constructed in the Alsek River Canyon to connect with the ALCAN pipeline at Haines Junction, Yukon Territory. The Alsek River Canyon, an area of outstanding natural beauty, is virtually untouched by man. Approximately 15 miles of the pipeline and attendant service road would cross the extension to Glacier Bay National Monument in the upper reaches of the canyon. This action is diametrically opposed to the objectives and uses for which this area was created. Furthermore, this area will be considered for wilderness designation by the National Park Service. The magnitude of the impact on the Alsek River drainage is the same for all alternatives. 1

Alternative V considers the construction of a 20-inch oil pipeline and attendant development from Point Manby to Icy Bay, approximately 30 miles along the forelands of the Malaspina Glacier through Wrangell-St. Elias National Monument. Apparently this alternative is a tradeoff of possible impacts on Icy Bay vs. Yakutat Bay if a major oil spill should occur. This alternative is contrary to the purpose for which Wrangell-St. Elias National Monument was created. In addition the area will be considered for wilderness designation. 2

Alternative IV considers the deletion of 132 blocks in the northeast and northwest portion of the lease sale area with offshore transfer facilities for oil, while a gas pipeline, offshore and onshore, would ultimately transport the resource through the Alsek River drainage to Haines Junction as previously outlined. 3

We are cognizant of the Secretary's responsibility to provide for national energy needs, and we recognize the transportion of natural gas from a production site to market is environmentally more sound by pipeline than by tankers. We believe, however, that if the gas pipeline were to be constructed through the Alsek River drainage for more than 100 miles to the Haines road, the resultant physical and aesthetic impacts to one of the potentially greatest international wild and scenic rivers would be unacceptable. 4

SPECIFIC COMMENTS

Alternative I, page 14. Federal Administration and Regulatory Responsibility: This section does not recognize the responsibility of the National Park Service to provide advice on cultural resources as outlined in Secretarial Order 2974 (revised). Perhaps this fact should be noted under the heading Stipulation for protection of cultural resource, page 19. 5

Alternative V, page 56. This alternative should fully recognize the adverse effect on the Malaspina Glacier forelands resulting from the construction of the onshore oil pipeline through Wrangell-St. Elias National Monument. 6

Conclusion: page 211. This statement should be changed to reflect the fact that the Wrangell-St. Elias National Monument was created by presidential proclamation on December 1, 1978 and does, indeed, include the majority of the Malaspina Glacier and its forelands for the purpose of protection of this great glacial system. 7

C. Irreversible and Irretrievable Commitment of Resources: pages 229-230.

This section should recognize the fact that the upper reaches of the Alsek River drainage is within the addition to Glacier Bay National Monument. It should further indicate that the oil pipeline considered in Alternative V from Point Manby to Icy Bay passes through the Wrangell-St. Elias National Monument. 8

D. Conflict Between Proposal and Other Action: page 232.

For completeness, the fifth paragraph on page 232 should also recognize the addition to Glacier Bay National Monument. 9

Appendix D. There was no mention in the text on Seward, Alaska, of Kenai Fjords National Monument created by presidential proclamation December 1, 1978 (page 12). It should also be noted that the Wrangell-St. Elias National Park, although still a legislative proposal, was designated a national monument by presidential proclamation December 1, 1978 (page 15). 10

Comments Concerning Cultural Resources

A. Static Cultural Resources

The Stipulation for Protection of Cultural Resources (I.B.1.b: p. 19) appears to apply primarily to offshore lease blocks and not to land based leases or developments such as the Alsek River Canyon gas pipeline. Also, marine survey and underwater archeologists are the only professionals noted in the section. It is recommended that the section be rewritten to explicitly address the protection of land based cultural resources (archeologic and historic sites), not only submerged archeologic sites. Archeologists with land based archeological survey and excavation experience should be specified as the professionals to accomplish terrestrial tasks and they should meet the qualifications set forth in 36 CFR 61.5. 11

The section also does not explicitly state that a preconstruction survey, designed to locate, describe, and determine the significance of archeologic and historic sites will precede any ground disturbing activities be they exploratory, developmental or otherwise. Preconstruction surveys should be prescribed as required by Executive Order 11593, and determinations of eligibility for the National Register of Historic Places must be made for each site located as a result of such surveys. The comment and review process must then follow for sites deemed eligible for inclusion in the National Register of Historic Places as required by the National Historic Preservation Act of 1966 and 36 CFR 800. 12

Land based surveys should be made along coastal areas which could be impacted as a result of oil spills and cleanup operations. The potential for severe damage as a result of cleanup operations should be addressed and mitigating measures developed and included with the Draft Environmental Impact Statement. These surveys should begin as soon as a development scenario is chosen for the sale. Surveys should also begin on site-specific land based developmental areas (pipelines, borrow pits, construction sites, etc.) at this time. Since archeological surveys have not been undertaken in a majority of the area that could be impacted by Sale No. 55, there is no assurance that significant cultural resources do not exist in these areas. This situation should be rectified. 13

Since national monument lands (Glacier Bay and Wrangell-St. Elias) will be impacted by the assorted developmental scenarios as presented, any archeological programs affecting lands under National Park Service jurisdiction should be developed in consultation with the Cultural Resources Branch of the Alaska Area Office, National Park Service. All archeological work on National Park Service lands should meet National Park Service standards for such work as set forth in the NPS cultural resource management guidelines. Reports of investigations prepared by archeologists working on National Park Service lands should be submitted to the Director of the National Park Service's Alaska Area Office, for review. Should the Director determine a cultural resource exists which may be adversely affected by an approved operation, the operation may not take place or continue until directions have been given by the Director as to the disposition of the resource or its preservation. The consultation process as described in 36 CFR 800 will precede such determinations. 14

National Park Service archeologists should be involved with monitoring all archeological work and construction activities on Service lands. 15

Since the development scenarios all specify severe impacts to known onshore cultural resources, and we can assume severe impacts to many other as yet undiscovered archeologic and historic sites as well, the No Sale Alternative (Alternative II) is the most desirable option from a cultural resource management perspective. Salvage archeology cannot be viewed as an option when preservation is foreclosed as a viable alternative. This seems to be implied in many of the report sections dealing with the environments' consequences of various actions. 16

The "positive effects" of the proposed actions on cultural resources as outlined in the DEIS for Sale No. 55 cannot be viewed as positive when National Park Service cultural resource management philosophy provides for the same effects in nondevelopment contexts. That is, positive effects, resulting from historic and archeologic surveys on Service lands will simply result through the implementation of National Park Service programs and policies. 17

B. Dynamic Cultural Resources

The treatment of subsistence is inadequate. There appears to be no consideration of seasonal activities and variations in resources utilized nor of specific use areas. The social and cultural aspects of subsistence which include but are not limited to sharing, the ceremonial importance of certain species, and the importance of subsistence in the education of young people are not evaluated or considered. 18

A background on the cultural environment (prehistory and history) is lacking. A thorough review of Dr. Frederica deLaguna's Under Mount St. Elias (3 vols.) would help to establish that context. It might also be helpful to review Rober Ackerman's The Archeology of the Glacier Bay Region, Southeastern Alaska available from Washington State University Laboratory of Anthropology, Report of Investigations, No. 44. 19

A subsistence study conducted by Dr. Steve McNeary of the Cooperative Park Studies Unit, University of Alaska, Fairbanks titled Local Exploitation of D-2 lands in the Gulf of Alaska Region (Occasional Paper #16) provides valuable information. Dr. Steve Langdon of the University of Alaska, Anchorage (Dept. of Anthropology) has been studying utilization of the sea environment in southeast Alaska and should be given an opportunity to comment on the data you have compiled. 20

STATE COMMENTS

United States Department of the Interior
FISH AND WILDLIFE SERVICE
WASHINGTON, D.C. 20240

ALASKA OCS OFFICE ANCHORAGE, ALASKA
JAN 2 12 A2 PM '80

DEC 1 1 1979

Memorandum

To: Director, Bureau of Land Management
(Attn: 720)

From: Director, Fish and Wildlife Service

Subject: Review of the Draft Environmental Impact Statement (DES) for the Proposed OCS Sale No. 55 - Eastern Gulf of Alaska

We have reviewed the subject document and feel the DES adequately addresses the issues and outlines the alternatives. However, we remain concerned over the absence of protective stipulations for the biological resources of the lease area. Particular care should be taken when operating in the vicinity of marine bird and mammal concentrations. Rookery areas require a buffer zone to protect them from general disturbance and possible toxic effects of concentrated drilling effluents. Studies conducted in the Barren Islands and elsewhere indicate that high concentrations of marine birds utilize areas within approximately 6 nautical miles of their rookeries during breeding and resting periods. Comparable data is unavailable for marine mammals, but it is assumed that they would be relatively dispersed beyond 6 miles from their rookeries. We reiterate FWS concerns expressed in our July 31, 1978 response to the Call for Nominations, and recommend, to adequately buffer marine bird and mammal populations from detrimental disturbance, that there be no leasing within 6 miles of the major coastal rookeries. At an absolute minimum to protect these species, a biological stipulation should be rigorously applied to the nearshore tracts from Yakutat Bay to Dry Bay that accommodates: (1) limitations on discharges; (2) lighting on the rigs at night; (3) aircraft control or corridors; (4) space competition from infrastructure siting onshore; and (5) platform placement. 1

The discussion on Page 229 regarding endangered and threatened species does not include reference to formal consultation with the Fish and Wildlife Service. We recommend that the Final Statement include a reference considering Section 7 consultation with the Service. 2

We appreciate the opportunity to comment at this time.

Lynn A. Greenwalt

01-A3LH

JAY S. HAMMOND, Governor

OFFICE OF THE GOVERNOR
DIVISION OF POLICY DEVELOPMENT AND PLANNING

POUCH AD
JUNEAU, ALASKA 99811
PHONE: 465-3512

November 2, 1979

ALASKA OCS OFFICE
ANCHORAGE, ALASKA
NOV 7 1 35 PM '79

Ms. Esther Wunnicke, Manager
Alaska Outer Continental Shelf Office
P.O. Box 1159
Anchorage, Alaska 99510

Subject: OCS Lease Sale #55
State I.D. No. 790000804ES

Dear Ms. Wunnicke:

We appreciate the opportunity to review the draft environmental impact statement for OCS Lease Sale #55 in the Gulf of Alaska. As you know, the State of Alaska has had a particular interest in federal leasing activities in the Gulf during recent years and has invested considerable effort in trying to facilitate sound planning in the area. The City of Yakutat has recognized its stake in Gulf lease sales and has also been heavily involved in working with the oil industry and State and federal governments.

As a result of a multi-agency review of the draft EIS, our response consists of 1) recommendations on better describing the coastal management program, 2) proposed tract deletions, 3) proposed mitigating measures and 4) the enclosed, more specific comments. The latter includes a package of EIS maps on which staff resource specialists have indicated suggested modifications.

Coastal Management

We feel that the language in the draft EIS should be updated to reflect the fact that as of July 9, 1979 the Alaska Coastal Management Program (ACMP) is federally approved. At some points the text does reflect federal approval of the ACMP, yet most of the discussions of coastal management concerns do not.

The State maintains that the issuance of federal licenses and permits, the granting of federal financial aid and the conduct of other federally sponsored activities in the coastal zone should be consistent with the policies and regulations of the ACMP. Additionally, the State will examine federal oil and gas lease sales such as Sale #55 for consistency with the program. Consistency determinations will be made at several stages including production of the final EIS, the final Notice of Sale and stipulations and certain post-leasing activities such as specific plans of operation. 1

The U.S. Department of Justice recently issued a legal opinion which stated that provisions under Section 307 (c)(1) of the Coastal Zone Management Act of 1972, as amended, require that certain OCS pre-lease activities are subject to federal consistency determinations. The Department of Interior has stated, in the case of California OCS Sale #48, that there are no direct effects in pre-leasing activities and has not provided a consistency determination. This consistency question is yet unresolved. Mediation between the Department of Interior and the State of California, with the aid of the Department of Commerce, may conclude soon and thus facilitate coastal management decision-making for Alaska OCS activities. At the present time, the State of Alaska intends to request from the Department of Interior a consistency determination on Sale #55 and all other outer continental shelf lease sales. Although the present sale and others on the proposed five-year schedule are "purely federal" projects, spillover effects that significantly impact the coastal zone or uses within the purview of the State's program oblige the federal agency to comply with Section 307. 2

With respect to coastal management planning activities in the sale area, as noted in the draft EIS, a coastal management planning effort has been launched by the City of Yakutat and a draft of that plan is expected within about 30 days. The City's request for a 12-month extension beyond the federally-mandated district program completion date of December 4, 1979 will probably be approved and it is expected that a completed plan will be submitted to the Coastal Policy Council by spring of 1980. While the Yakutat coastal management program will not be fully approved and implemented by the date of the proposed sale (October, 1980), additional information for OCS planning in the eastern Gulf of Alaska should become available. 3

The State is in the difficult position of recognizing intense national pressures for oil and gas development on the continental shelf and at the same time having a responsibility to Alaska citizens for ensuring that OCS leasing proceeds at a prudent pace. The State has attempted to recommend only those delays in the currently proposed federal five-year leasing program that it considers essential. As you know, Sale #55 is a sale that Governor Hammond has recommended for the period 1980-1985. There are, however, some benefits to be derived from a one-year delay in the lease sale. First, a delay would provide for legislative approval of Yakutat's coastal management program and a head start on implementation. Second, it would facilitate decisions on tract deletions, pipeline routing, onshore facilities siting and an array of other pre- and post-leasing decisions. And finally, it would better assure consistency with the Alaska Coastal Management Program and a future district program as well. 4

The boundaries of the proposed Yakutat coastal management program fall along the City's corporate limits, however, Yakutat intends to develop a program for a "study area" which extends the length of the coast from Cape St. Elias to the north to Dry Bay on the southern extremity, a distance of some 320 statute miles. Preparation of this sub-regional 5

ALASKA OCS OFFICE
NOV 7 1 35 PM '79

plan will greatly assist the State of Alaska in its protection and regulation of state-owned submerged lands and shoreline and will be, no doubt, of some relevance to exploration and production plans.

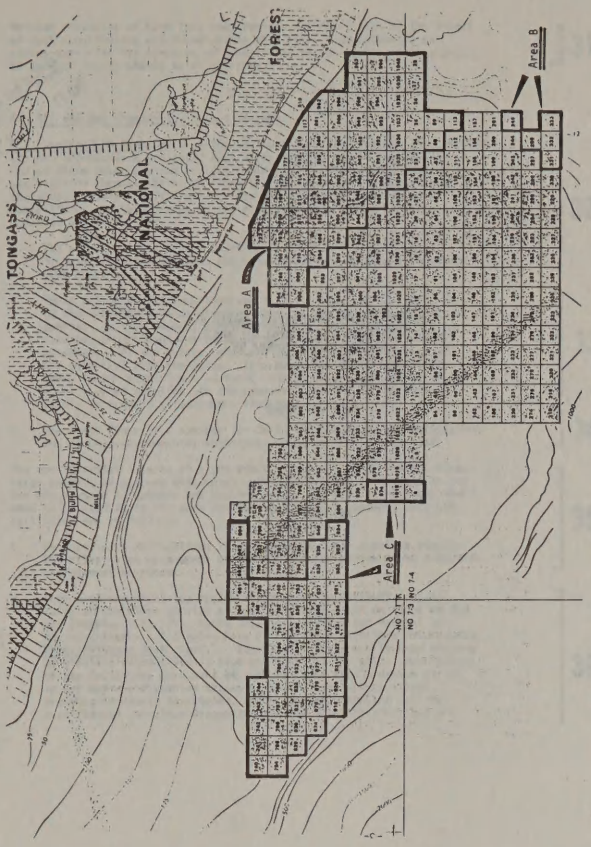
Further, a brief delay would give additional time to determine the area's fisheries management needs and an opportunity to allow completion of a planned, but not yet fully approved, oil spill contingency program, as potentially funded through the Coastal Energy Impact Program. Data gaps, some of which appear to be crucial, such as circulation and trajectory models, can be filled in the meantime. These disciplines have previously received little attention in the far eastern Gulf. 6

In light of these considerations, conduct of Sale #55 in October, 1980 would have a clear impact on the Alaska Coastal Management Program planning process - a conclusion directly contrary to one made several times under varying alternatives in the EIS. On page 89, for instance, is an accurate description of the Alaska Coastal Management Act, but a thorough understanding of the Act is not revealed in the comments on pages 166 and 167. An updated and corrected revision would be appropriate on these pages as well as on pages 187 and 188 where the status of a district plan is discussed. 7

The discussion of environmental impacts related to coastal management is somewhat puzzling in that assessments made for the proposed sale and its varying alternatives are for the most part assumed to "not have adverse effects on the Alaska Coastal Management Program" or "on the coastal management planning process." In reality, questions that should have been addressed by environmental analysts are: 1) whether all potential impacts as related to coastal management use and resource standards have been sufficiently identified and evaluated and 2) how these requirements will alter the proposed sale provisions as well as the posed alternatives. We understand that because the ACMP is a new and not yet well-known program that federal and other governmental agencies have yet to fully integrate coastal zone management concerns into their various study and planning efforts. Because Sale #55 and all other OCS sales relate so closely to coastal management considerations, we urge you to consider modifying your coastal management analyses for EIS's in order that consistency requirements incumbent on BLM and its parent agency can be more easily determined in the future. The State's Office of Coastal Management would be pleased to work with you in this regard. 8

Proposed Tract Deletions

The draft EIS in conjunction with the revised data enclosed indicates that adequate protection of sensitive fish and wildlife resources in the proposed area of Sale #55 requires deletion of those lease tracts identified as Area A on the following map. 9



State of Alaska's proposal for Eastern Gulf of Alaska OCS oil and gas lease sale #55. Area A is proposed for deletion and areas B and C are proposed as contingency areas. Please see accompanying letter for explanation.

Nov 13 2 20 PM '79

This area is located in the northeastern corner of the proposed sale area, poses an exceptionally high oil pollution hazard to important coastal fish and wildlife habitat between Yakutat Bay and Dry Bay. No circulation model was provided in the EIS, however, available data indicate a general westward drift with little understood large-scale eddies, and onshore surface transport during much of the year. As a consequence, the probability that an oil spill in Area A would impact the coastal environment between Dry Bay and Yakutat Bay is quite high, as is pointed out in the EIS risk analysis. This coastal environment is also an area of relatively high biological resource value. The coastal area between Yakutat and Dry Bay, particularly the lagoons and bays, is seasonally utilized by millions of migrating waterfowl and shorebirds and is also an important and productive nesting area. Most of the area's major salmon spawning streams are found along this section of the coast. Also located in this area are important bottomfish habitat, relatively high concentrations of halibut, razor clams, scallops, dungeness crab and important fish rearing and shellfish spawning and rearing areas. The commercial and subsistence fisheries in the nearshore area between Yakutat Bay and Dry Bay are highly important to Yakutat area residents. 9

Spills in Area A also pose a much greater hazard to the concentrations of fisheries resources in the vicinity of the Yakutat Sea Valley and to coastal areas west of Yakutat Bay due to the general westward component of circulation through the area.

Compared to other areas in the proposed Sale #55 area, Area A poses an exceptionally and disproportionately greater threat to virtually all of the most important fish and wildlife resources found throughout the area from Dry Bay to Icy Bay, and it is, therefore, recommended that Area A be deleted from the sale. As our Office of Coastal Management has pointed out, this deletion is all the more important if the sale proceeds prior to completion of coastal management study efforts for adjacent coastal areas. 10

Proposed Contingency Areas

Areas requiring special consideration because of sensitive fish and wildlife resources are identified on the above mentioned map as Areas B and C. These we propose as contingency areas and our concurrence with leasing in them must necessarily await identification, in the final EIS, of appropriate mitigating measures. These measures should stress institution of means to prevent interference with commercial fisheries, prohibition of discharge of toxic substances including formation waters for selected shallow tracts and improved oil spill containment and cleanup capabilities. 11

Nov 13 2 20 PM '79

If adequate mitigating measures cannot be identified, our position would favor tract deletions in these areas. Our Departments of Fish and Game and Environmental Conservation are, incidentally, very willing to participate with you in the development of such measures.

1. Area B, located in the southeastern corner of the proposed sale area, is situated over a portion of the valuable Fairweather Grounds fishing area. In addition to concentrated commercial fishing activities, the Fairweather Grounds are also an extremely important rearing area for southeast Alaska king salmon stocks which are currently depressed because of a variety of reasons. Oil and gas activities including support vessel traffic in Area A may cause major conflicts with the commercial fishing activities in this area. Pollution resulting from oil spills or discharge of toxic drilling muds and formation waters in Area B may pose a significant hazard to the concentrations of marine life, especially king salmon, which utilize the Fairweather Grounds. 12

2. Area C, located in the western part of the proposed lease area, is situated in an area of diverse and important fisheries resources. This is particularly evident in the revised Graphic Number 4 (enclosed) which shows the major finfish and shell fish distributions. The area is an important halibut spawning and rearing area, and provides important and productive demersal fish habitat. High numbers of tanner crab and Pacific Ocean perch are also found here, and the area is important to the commercial fisheries. Potential pollution such as spills, disposal of muds and cuttings and discharge of formation waters could adversely affect demersal fish eggs and larvae, which are concentrated in the surface waters, and other important fish and shellfish resources in the area. Significant conflicts between oil and gas development/support activities and commercial fishing activities may occur. 13

Proposed Mitigating Measures

In addition to the tract deletions and standard mitigating measures for Federal OCS lease sales, the State of Alaska suggests that the following additional measures be implemented to mitigate the impacts of this sale: 14

1. USGS should establish minimum performance standards for the oil spill containment and cleanup organization(s) formed to protect the Sale #55 area. This organization must have sufficient oil spill containment and cleanup equipment on hand to protect all critical habitats in the eastern Gulf sale area from the effects of the major oil spill predicted for the sale area over the life of the field. To be effective, detailed plans must be developed for protecting individual habitats and populations in advance of any spill. New equipment must be developed which is capable of containing and cleaning up oil in the extreme sea and weather condi-

Nov 13 2 20 PM '79

tions prevailing in the lease area, including winds greater than 19 knots, currents greater than 1 knot and waves greater than 6 feet. Elements of this organization should be stationed at strategic locations around the lease area to ensure that the oil spill containment and cleanup equipment arrives at critical habitat areas before the oil slick does. Oil spill containment and cleanup equipment should be stored on the beach near the mouths of each of these extremely important estuarine/river systems: Lost, Situk, Dangerous, Alsek, East Alsek and Doame. Should an oil spill occur, rapid preventive action could exclude oil from these important salmon migration, spawning and rearing areas. These areas are also vital waterfowl, shorebird and seabird staging and foraging areas. The millions of birds utilizing these areas are very sensitive and vulnerable to oiling and large losses could occur as the result of a spill. If an oil terminal is built in either Monti and Icy Bays, oil containment booms and cleanup equipment should be located in the selected bay to decrease environmental impacts associated with an oil spill.

2. No OCS facilities which require extensive aircraft or support vessel traffic, or the storage of large quantities of fuel should be permitted in the Ankau Saltchuck, important waterfowl nesting areas around Monti Bay, or the coastal marshes of the Yakutat Forelands. 15

3. No seismic exploration employing high velocity explosives should be conducted in the Sale #55 area. 16

4. No low level aircraft or helicopter flights should be allowed over waterfowl nesting areas in the Yakutat Forelands, Yakutat Bay area or over coastal seabird colonies during the period of April through October. 17

5. Operations should be scheduled and supply routes planned to avoid conflicts with commercial fishing activities and gear in the lease area. 18

6. All pipelines and subsea production facilities, abandoned wells and similar facilities should be buried well below the maximum scour depth to ensure they do not conflict with future trawling activities in the area. 19

We appreciate the opportunity to review the draft EIS. In so doing, we are impressed once again by the tremendous task your office faces in producing quality environmental impact statements for a rapidly increasing number of lease sales. The lack of comprehensive syntheses of existing information is one of the major impediments to an expeditious and safe offshore oil and gas leasing program. Considering the critical energy demands of the Nation and the importance which has been placed upon an accelerated yet environmentally safe leasing program, and the 20

monumental dollar value of the oil and gas resources involved, we feel that it is unquestionably justified that the Alaska BLM/OCS Environmental Evaluation Team be provided with additional staff to carry out its task. We feel that most of the deficiencies of the Eastern Gulf of Alaska draft EIS are a direct result of work overload. Elimination of such discrepancies tends to reduce the skepticism with which environmental interests, fishermen and others are likely to view the leasing program. This, in turn, tends to increase confidence in an expanded federal offshore leasing program. In the context of the Secretary's proposed OCS leasing schedule involving nine sales in the next five years, we fully support the need for your gaining augmented staff support in the months ahead. 20

We hope that our comments are useful and that our proposals can be accommodated. Please feel free to contact me, my staff or individual State agencies on any points that you think deserve discussion.

Sincerely,

Frances A. Ulmer
Director

Enclosures

cc: Mayor Larry E. Powell, Yakutat

ALASKA OCS OFFICE
ANCHORAGE, ALASKA
Nov 17 1 39 PM '79

Specific State of Alaska Comments on
Draft EIS for Federal Oil and
Gas Lease Sale Number 55

Gulf of Alaska

November 1979

1. Community Impacts

We are concerned that the draft EIS dismisses too readily potential population and employment impacts on the City of Yakutat through OCS development and production activities. The underlying assumption is that there would be a petroleum worker and service "enclave" separate from the town of Yakutat. 21

All development scenarios, except Alternatives V and VI, assume that there would be an oil terminal on Monti Bay and all assume that there will be a gas pipeline through the Alsek River Canyon or an LNG facility on Monti Bay. While an "enclave" could considerably reduce the amount of impact from such major activities so close to Yakutat, it is difficult to envision a situation in which there would be no direct or induced population or employment increases at all. 22

We concur with the testimony given by the City of Yakutat at the draft EIS public hearing in Juneau on October 26, 1979, to the effect that potential impacts on the City beyond the exploration stage were not adequately considered within the document. 23

And finally, we wish to point out a reaction on the part of one State agency that the general tone of community impact descriptions in the draft EIS stressed the negative rather than the positive. The basic question of whether a local impact is positive or negative is, of course, a function of values expressed by local government. It might help if in the final EIS, there were a summary of Yakutat's involvement in Gulf of Alaska OCS activities and the highlights of what the City's positions have been. 24

2. Population Impacts

Without question, estimates of population growth in the Yakutat area are critical in any attempt to identify and evaluate the socio-economic impact of the proposed sale. However, the projections contained within the narrative of the EIS are too incomplete to allow even base or mean case analyses. 25

Table III.A.3.b.-1, opposite page 120, details Yakutat-specific population forecasts only in the "no-sale" scenario. Projections for population increases due to the mean scenario for Sale #55 are scheduled only on a State-wide and regional basis. As a result, Table A.2.b.-1, opposite page 150, should be expanded to allow the inclusion of OCS population projections for Yakutat specifically. Concomitantly, sufficient narrative must be developed to augment this additional data. 26

3. Employment

An assumption upon which employment projections related to the mean scenario are evaluated as to impact on Yakutat must be challenged. On 153 of the Draft, the narrative reads: 27

> "Little impact is likely because much of the fishing and fish processing for the Yakutat area is, for example, done by fishermen of processing plants from other areas, and it is difficult to see any second round impact."

Up until a fire destroyed the cold storage facility, Yakutat was served locally by two processing facilities across the last ten years. Local policy has remained constant in supporting a minimum of two plants in Yakutat. The City is in the final negotiation process which will culminate in a three-year, $10 million cold storage reconstruction and expansion project to be undertaken by the Yak-tat Kwaan beginning this next spring. Consequently, secondary effects due to job shifting and in-migration could be significant and must be reanalyzed.

While on the subject of employment two additional points must be made. First, the expansion of the local labor force to allow local business and service industries to expand their capabilities to serve OCS-related development is no where treated within the narrative. It is another factor which closely interfaces with issues such as "job-shifting" and "in-migration" and must be detailed. 28

Second, the Table on page 153, "Yakutat Employment Forecast with the Proposal (mean case)" should be expanded to include the primary and secondary considerations noted above and must also be so scheduled to show annual increments of population projection. The five-year increments used presently completely obliterate the peaks associated with construction periods. 29

4. Other Southeast Alaska Impacts

In Appendix D (Regional Economies and their Impacts) there was no analysis or discussion of the impacts of Sale #55 on the southeast region (other than Yakutat), nor is this region shown on Figure D-1 as one which may be directly affected by the proposed sale. The southeast Alaska region should be analyzed in this regard in the final EIS. The outer coast environment of all of the southeast Alaska could very well be negatively impacted by a tanker oil spill anywhere along the 500 miles of its exposed rocky coast. A 1977 report published by the City and Borough of Juneau's Planning Department entitled, "Juneau Outer Continental Shelf Oil Impact Examination: Phase I," concludes that OCS activity in the Gulf of Alaska offshore from Yakutat would have some secondary impacts on the Juneau area. Sitka and Ketchikan might also be the sites of direct or secondary impacts from the proposed Sale #55, particularly if those cities are utilized in any capacity as support, supply, or transhipment bases for oil exploration and development activities. These factors also need to be discussed in the final EIS. 30

5. Land Use Requirements

Another major area which needs more basic data is that which addresses land use requirements. Within the draft of this EIS, no estimates are constructed for enclave settlement. That such impact is significant is strongly noted in the draft EIS for the proposed five-year OCS oil and gas lease schedule. 31

Neither estimates of such land requirements nor discussion of the impact of such requirements are found within this EIS. Such estimates and siting scenarios for purposes of identifying and evaluating this aspect of enclave impact should be established. 31

6. Oil and Gas Transportation and Storage

Gas Pipeline/LNG Terminal. Although impacts of the proposed gas pipeline are not addressed in the draft EIS, major impacts on the onshore fish and wildlife resources and habitat could result from construction of a gas pipeline through the Alsek River Valley. Much of the severity of the impacts would result from disturbance during the construction, surveillance and maintenance of the pipeline. Some of our initial concerns are as follows: 32

1. The proposed Alsek Valley pipeline would pass through Tongass National Forest land which has been classified as LUD II (roadless back country).

2. There are major problems involved in traversing the St. Elias Range to the interior. Major glaciers threaten the route at several points. In this region, glaciers have not been intensively studied, though they are believed to be either static or slowly advancing. At two points, glaciers lie within a mile or two of the potential pipeline route. This poses two major hazards if there is any significant advance: the physical destruction of even a well-buried pipeline and the temporary damming of the river, likely to produce catastrophic flooding. 33

3. The Alsek River is a nominee for "Wild and Scenic River" designation and strong environmental objections would certainly be raised. 34

The environmental impacts of a gas pipeline may not be warranted unless large amounts of gas are discovered. An LNG facility at Yakutat or Icy Bay may be more acceptable but gasline versus LNG facility impacts would need to be studied in far more detail. Our initial concerns over LNG facilities are as follows: 35

1. We anticipate difficulties in running a seafloor pipeline roughly 200 miles in an area where even North Sea lay barges might encounter operational problems.

2. Port development at Icy Bay may be impeded by extremely rapid rates of shoreline erosion and sediment deposition on sides of the bay (Molnia, B.F. 1977. Rapid Shoreline Erosion and Retreat at Icy Bay, Alaska - A Staging Area for Offshore Petroleum Development. Proc. Offshore Tech. Conf.). Icy Bay has historically been growing as glaciers retreat and is also migrating to the west. Development of any facilities that must be used for more than a season or two in Icy Bay would require extensive breakwaters and continual dredging to remain functional. Such development might well be justified by petroleum discoveries in the Sale #39 area, but the 36

distance, seafloor geologic hazards and other factors may not make Icy Bay a practical shore facility site for the Yakutat tracts. There may be no viable alternative to the development of an oil/LNG shipment site very near Yakutat if there are discoveries in the Sale #55 region; if so, the EIS should clearly recognize this inescapable fact.

Oil Pipeline. There is little discussion of the direct impacts that the proposed oil pipeline to Yakutat would have on upland areas. As depicted in the figures accompanying Alternatives I, IV and V the proposed oil pipeline would cross Ophir Creek. Ophir Creek is a very important aquifer recharge freshwater system which local residents value for its wildlife and commercial and subsistence sockeye and coho salmon resources. The creek originates within the City of Yakutat and unlike other local streams, does not freeze over in the winter. A late salmon run spawns in Ophir Creek, and in turn is utilized as a winter food source by other animals. Wildlife including bears, wolves, lynx, river otters and approximately 60 bald eagles concentrate along the creek in winter to feed on the spawned-out salmon. 37

Oil Pipeline/Terminal/Single Point Mooring. Because the problems of habitat destruction, disturbance, chronic oil pollution and threat of a major oil spill associated with oil storage and transportation, the State would prefer that any oil terminal associated with Sale #55 be located in the least biologically productive area available. Icy Bay would be the most favorable location with respect to the distribution of vulnerable biological resources; however, other factors enter into the decision including ice hazards and a shallow sill at the entrance to Icy Bay. Depending on the location of development wells, the extreme length of a pipeline necessary to reach Icy Bay from the more easterly tracts in the lease area may pose an unduly high pollution hazard, and negate any benefits to be gained from locating facilities in this area. In some cases Yakutat Bay might be a preferable terminal location. This would be especially true where subsea pipelines would be shorter and if the risks of a tanker accident would be significantly reduced. We have serious reservations about the desirability of an offshore single point mooring oil transfer facility as suggested in Alternative VI. The Eastern Gulf of Alaska is clearly an area of extreme winds and large waves, and attempting to load a large oil tanker under these conditions would present a great oil spill risk. A large wave or high winds could not only break mooring lines and loading hoses, but could also damage the tanker and the single point mooring itself and result in a very large oil spill. We suggest that a great deal of study be given to this approach before it is given serious consideration or used as a viable option in the economic analysis of a sale area. 38

7. Oil Spill Trajectory/Risk Analysis

This is probably the best attempt yet at providing an intelligible description of the derivation and meaning of the oil spill risk analysis, however, the complexity of the analysis inevitably generates a certain credibility gap with most reviewers In particular, reviews of previous 39

computerized oil spill risk analyses have made us all to aware of the major variations between model results and the actual "in situ" transport of surface pollutants which result from technical limitations on the modeling process. A prime example is the Beaufort Sea spill model which, due to a limitation of the computer, arbitrarily prevented onshore transport of oil. To reduce this credibility gap, we feel it is imperative that more emphasis be placed on providing graphic baseline data which provide intuitive justification of the spill trajectory/risk analysis. Critical information gaps in the EIS discussion of the risk analysis are (1) a circulation model(s) and (2) wind roses showing wind speed, direction and frequency by season. Graphic No. 2 (Meteorological Conditions and Physical Oceanography) provides important background information, but the graphic representations are not sufficient.

Additional comments on the risk analysis are:

1. It is not clear whether risk probabilities include potential tanker spills. 40

2. The land segments figure (Figure III.A.1.d.-4) which depicts areas of oil spill impact appears to exclude Yakutat Bay. If this is the case, then calculations of spill impact probabilities apparently also exclude Yakutat Bay where tanker and terminal spills carry a high probability of spill imapct. 41

3. Table III.A.1.d.-3 (Probabilities that an oil spill starting at a particular location will reach a certain target in three days) and related tables on following pages indicate the probability for reaching "Land" in general is either less than, or relatively low compared to, the probability for reaching certain smaller segments of land. For example, in Table III.A.1.d.-3, under Hypothetical Spill Location A1, the probability of oil reaching "Land" is 31 percent whereas the probability of oil reaching "National Monument/Wilderness," which is a smaller segment of the "Land," is 42 percent, and the probability of oil reaching "Wolf Habitat" is 53 percent. This apparent paradox should be clarified in the final EIS. 42

8. Physical Oceanography and Meteorology

Pages 109-114 and 119-125 as well as Graphic #2 describe this subject. This is the information necessary to describe both general circulation and the possible trajectories of pollutants, hence essential to any serious discussion of impacts upon the biota of the region or for oil spill risk analysis. The Sale #55 tracts are directly upstream from the region studied previously. In the Sale #39 area, it has been found that there is net transport toward the west, effectively part of the counterclockwise Alaska stream, most intense close inshore and seaward at or beyond the shelf break (approximately the 100-fathom isobath), with a zone of more sluggish movement across most of the shelf. This interpretation apparently, for the text is rather obscure, has simply been extended upstream and assumed to apply to the Cape Fairweather-Yakutat region (Figure 1). This interpretation is plausible, but it would be just as plausible to infer a strong influence from Cross Sound and hence a more intense, uniform 43

flow over the shelf, considerably stronger inshore than to the west, possibly splitting with major flow diverted offshore along the trends of Alsek Canyon and Yakutat Sea Valley. The influence of the Alsek Canyon upon the flow is quite unknown, but it could well be the site of large scale up- or downwelling of coastal waters and hence a very potent influence upon the distribution of primary productivity (the basis of the marine food web) and the potential movement of pollutants. Recent satellite infrared imagery suggests still another circulation pattern.

There is no figure in the DEIS showing net circulation in the proposed lease area, although some model of this water movement is absolutely essential to any trajectory or risk analysis. Although the graphic (#2) shows detailed trajectories of eight drift buoys, the trajectories of such lagrangian drifters is never accepted, alone, by oceanographers as an adequate characterization of inshore or offhsore currents. The relevant text is printed on the graphic but concentrates on the limited research nominally conducted in the area (actually in the Sale #39 area), discusses coastal climatology in only general detail (a summary of monthly winds, the aspect of coastal climatology most relevant to oil spill trajectory analysis, is available in the OCSEAP Alaskan OCS Climatic Atlas), continues with a not too related discussion of near-shore katabatic winds (with some confusion evident between the general phenomenon and a specific variety of katabatic winds found 200 miles to the east, Taku Winds), and finally shares with us a 15-year-old Russian interpretation of permanent currents in the Gulf of Alaska (not irrelevant, but not very informative on the scale of the Sale #55 area). There is no reference whatsoever to the strenuous efforts of the OCSEAP program to develop adequate circulation models for the region in the past year. As it happens, two intensive surveys have been conducted, plus enough current measurement to provide the necessary ground truth to permit the production of a reasonable first approximation trajectory analysis for the region. This effort, fortunately, should be complete by the end of this calendar year and so would presumably be available for incorporation in the DEIS. 44

As it happens, in the Risk Assessment segment of the Sale #55, BLM has fallen back on an extremely dated MIT study conducted for the Council on Environemntal Quality back in 1973-74, excellent work for its time, but we've learned much about both the behavior of oil spills and circulation modeling since then. Actually, though this isn't apparent from the text or figures, the probability of substantial oil spill impacts may well be considerably less than the MIT study indicates. 45

9. Biological Impacts

State reviewers do not agree with many of the EIS statements which conclude that impacts on certain fish and wildlife resources would be minor, insignificant or short-lived. For example, throughout many of the various discussions of impacts on beaches, the emphasis on the "oil residence" concept implies or infers that the impacts terminate as soon as the oil is removed from the beach. This is definitely not the case since biological communities may require many years for recovery after the period of "oil persistence" in coastal environments is over. Unfortunately we lack the time required to conduct a detailed review of this and other such questionable EIS conclusions, but we do want to 46

point out that we feel there is a strong tendency in the EIS to subjectively downgrade the potential severity of oil spill impacts on the coastal fish and wildlife resources.

10. Meterology and Climatology

On the meteorologic and climatologic side, there may well be some real importance to the katabatic, "drainage" winds that are emphasized. As observed by OCSEAP researchers, such winds blow fairly consistently offshore in the Yakutat Bay to Kayak Island area, apparently generated by the enormous piedmont glaciers, the Malaspina and Bering. These winds, when not over-ridden by storm winds from the Gulf of Alaska, would tend to buffer the coastal zone from oil spills. Also, in the immediate vicinity of Dry Bay there is probably (but not positively known) a much closer analogue to the Taku winds of southeast Alaska, occasional, very intense, narrow katabatic flows offshore. None of this is suggested in the draft EIS text.

11. Historic Preservation

Page 158 and elsewhere. Indications that there is "0% chance of either a direct or indirect impact on a National Registered property resulting from spilled oil" is open to question. The New Russia site, a property on the National Register, may well be located immediately adjacent to the actively eroding beach. If so, cultural materials relating to this site may be eroding from the beach at the water's edge, and these would be directly impacted by spilled oil.

Comments on the "Stipulation for Protection of Cultural Resources" are as follows:

1. The Supervisor should work closely with the State Historic Preservation Officer (SHPO) regarding all cultural resource management concerns, and should follow the provisions of 36 CFR 800 (concerning the protection of cultural resources).

2. All data recovered as a result of remote sensing surveys, along with land and underwater archaeological surveys, should be forwarded to the SHPO for inclusion, if appropriate, in the Alaska Heritage Resources Survey.

3. Archaeologists conducting cultural resource surveys should, at a minimum, meet the requirements of 36 CFR 61.5 before being authorized to proceed.

4. It is recommended that, in addition to remote sensing surveys, the lessee (page 19, fourth paragraph) be required, as the need may arise, to conduct preconstruction archaeological surveys. Individuals actually performing these activities shall meet the qualifications for professional archaeologists as mentioned immediately above, and should be familiar with the equipment planned for use in such surveys.

5. Sites found as the result of such surveys shall be evaluated for possible eligibility status for the National Register of Historic Places. The provision of 36 CFR 800 shall apply.

6. All reports resulting from cultural resource survey activities shall be forwarded to the Supervisor, BLM OCS Office Manager, and the SHPO for review and approval.

7. All cultural resources found during the actual construction activities shall be reported immediately to both the Supervisor and the SHPO, and that part of the construction impacting said resources shall cease until the significance of those resources is determined jointly by the Supervisor and the SHPO.

12. State Parks Planning and Recreation

Page 86. It appears that sportfishing and hunting are perceived as separate from tourist activities when, in effect, fishing and hunting are very much related to tourism.

Page 87. There is no mention of walking, picknicking or boating as local recreational activities. These are indeed popular activities as they follow fishing in a ranking of local preferences for recreational activities. For instance, there is some picknicking at Cannon Beach and boating to Chicago Harbor and around Khantaak Island.

Page 86. The growing popularity of the Alsek River as white water expedition river should be mentioned. There are currently about 13 commercial operators seeking permits for trips down the Alsek.

Page 162. The level of use is not necessarily low for all places. For instance, a Yakutat area game biologist conservatively estimated that between 1,300 and 1,500 visitor days were expended duck hunting in and around the Ankau Lagoon, Tawah Creek and the Situk River last year. Additionally, the Forest Service estimates that over 1,000 visitor days of use were spent in 1978 for several of their cabins. This level of use does not appear to be low in our estimation.

Page 162. Beachcombing is also a recreational activitiy of the residents as well as tourists which may consequently be impacted, as the text suggests. Your section on impacts also did not address the quality of recreation experience that will be impacted. For instance, some areas near Yakutat, such as the Tawah Creek and the Lost River, are favorite fishing spots for local residents because of the current low to moderate use in these areas. It would also infringe on the ability of residents to obtain recreation services and facilities such as Forest Service cabins. OCS development could alter the freedom of recreating where one wants, when one wants and with few people around, thereby altering the quality of recreational experiences. Improvements in facilities, services and management can overcome some of these impacts but nonetheless they are impacts that should be addressed. Also unless efforts are made by state, local and Native organizations to set aside recreation lands near town some recreation opportunities may be lost to residential development such as Puget Cove and Khantaak Island. This is a possible impact not addressed.

Page 163. There most certainly would be unavoidable inpacts on the Alsek River's whitewater and river trip opportunities. The construction of a gas pipeline along the river could impact this most scenic and enjoyed river.

13. Other Comments

Description of Alternatives. The specific tracts being deleted in Alternatives IV, V, and VI should be listed in both the text and in the figures depicting the deleted areas.

Ankau Saltchuck. The high value of the Ankau Saltchuck to fish birds, mammals and its importance as a traditional subsistence use area for local Yakutat residents was not mentioned. This large saltchuck also has extensive productive eelgrass beds. The unmentioned direct and indirect impacts from either an oil spill in Monti Bay or the possible increased use of the area resulting from an unflux of people should be addressed in the final EIS.

Yakutat Forelands. The importance of the Yakutat Forelands to millions of migrating waterfowl and shorebirds was continually overlooked in the EIS.

Revision of Graphics. (Volume 3). Several key references (enclosed) appear to have been overlooked during compilation of the Volume 3 graphics showing biological distributions. As a result extensive major corrections are required on two of these graphics (Graphic No. 4, Major Fin and Shellfish Distribution, and Graphic No. 6, Marine and Coastal Birds), and they should be revised for the final EIS. Graphic No. 2, Meteorological Conditions and Physical Oceanography, does not provide a graphic interpretation (model) of circulation or seasonal wind patterns, and does not serve its intended purpose. It too should be revised and this information included. Graphic No. 10, Land Status and Land Use, does not show some important land use designations, and should also be revised. Additional comments are provided on Graphic No 3, Marine Habitats and Food Web Resources, and Graphic No. 5, Commercial Fisheries. The corrections which we have noted on the graphics elucidate significant differences in sensitivity and importance of various areas as compared to those origionally portrayed on the EIS graphics, and the additional information requirements which we have pointed out as missing are equally significant and essential to interpretation of potential impacts.

References. The following is a list of several important publications and reports which should have been utilized and referenced in the draft EIS. These references are necessary for a current and accurate portrayal of land classifications, Alaska Coastal Management Program standards, and commercial catch and harvest data, all of which are vital to meaningful analysis of alternatives and impacts.

1. Ronholt, L.L., H.H. Shippen and E.S. Brown. 1976. An assessment of the demersal fish and invertebrate resources of the Northeastern Gulf of Alaska Yakutat Bay to Cape Cleare May - August 1975. NEGOA Annual Report. NOAA, Northwest Fisheries Center, NMFS, Seattle, Washington. 184 pp. (Note: this report was funded by BLM for environmental assessment of the Northeastern Gulf of Alaska region).

2. Hits, C.R. and W.F. Rathjen. 1965. Bottom trawling surveys of the Northeastern Gulf of Alaska (summer and fall of 1961 and spring of 1962). Commercial Fisheries Review Vol. 27 (9) Washingotn, D.C. 15 pp.

3. Use the Alaska Department of Fish and Game's 1978 and 1979 "Reports to the Alaska Board of Fisheries." The catch and economic value data of all the commercial fisheries need to be updated by including information from the 1978 and 1979 "Southeast Region Reports to the Alaska Board of Fisheries," for salmon, crab, shrimp and scallops.

4. U.S. Department of Commerce, Office of Coastal Zone Management and State of Aalska Office of Coastal Management. 1979. State of Alaska Coastal Management Program and Final Environmental Impact Statement. 578 pp.

5. Fiscus, C.H., et al. 1976. Seasonal distribution and relative abundance of marine mammals in the Gulf of Aalska. U.S. Department of Commerce. NOAA, NMFS, Marine Mammal Division. Seattle, Washington. 238 pp.

Graphics. There are cartographic and informational errors on many of the graphics contained in Volume 3. Remapping and annotation has been accomplished insofar as time was available and annotated copies of the original maps are enclosed.

Appendix A. The following questions arose regarding the petroleum development scenarios and basic assumptions utilized to develop the proposal and its alternatives:

1. Tables A-1,2,3,4,5,6: These include one oil field and associated gas. Can associated gas production described continue 12 - 18 years after oil production ceases? Is this economically realistic?

2. Table A-1: Is only one well per year likely to be worked over for each of the last 16 years, excluding the shutdown year?

3. Table A-1 and some of the others show that wells are drilled at a yearly rate of 11, 11, 11 and 6 and then no more for the life of the field. Looking at all the fields drilled world-wide, is this realistic? Wells are drilled off and on throughout the life of the field as more is known about the configuration of the reservoir and particularly when and if secondary discovery operations are to be undertaken.

4. Page A3: "Production of formation water would be small during the first years of production, probably less than one barrel of water per 100 barrels of oil." There is no particular reason to believe that original water to oil ratios would be as small as 1:100. Also, statements in the same paragraph state that at the economic limit, produced water would have icreased to approximately 8 barrels per barrel of oil. An 8:1 water to oil water ratio is unreasonably high for the Gulf of Alaska.] 71

5. Page A5: This page indicates that two platforms are installed in 1985, drilling does not start until 1987 and pipeline construction starts in 1986. It would be more reasonable to say that drilling would start in 1986 and pipeline construction would start in 1986 or 1987. An assumption in the table is that although platforms will be installed in 1985, they will not be used for well drilling for a year or so.] 72

CITIES SERVICE COMPANY
ENERGY RESOURCES GROUP

CITCO

Cities Service Building
5100 Southwest Freeway
Box 27570
Houston, Texas 77027
(713) 850-6100

October 23, 1979

Mrs. Esther C. Wunnicke
Manager
Bureau of Land Management
Alaska OCS Office
P. O. Box 1159
Anchorage, Alaska 99510

Re: Availability of Draft Environmental Statement and Public Hearings Regarding Proposed Oil and Gas Lease Sale #55, Eastern Gulf of Alaska

Dear Mrs. Wunnicke:

Reference is made to Federal Registers Vol. 44, No. 171 dated Friday, August 31, 1979, at pages 51342 thru 343, and Vol. 44, No. 197, dated Wednesday, October 10, 1979, at page 58548. Both notices regarding the availability of the Draft Environmental Statement and the holding of Public Hearings in Yakutat and Juneau on October 24 and 26, 1979. These hearings to consider the proposed sale as captioned above and the proposed offering of 350 tracts located in the Eastern Gulf of Alaska.] 1

Cities Service Company supports the Department in offering these tracts for lease. We also reaffirm our past endorsement of continuing periodic OCS oil and gas lease sales under known and established rules and regulations.] 2

We are of the opinion such an orderly progression is a necessary ingredient to the President's energy program.] 3

We also encourage a timely and orderly development of not only the Eastern Gulf of Alaska but all OCS areas. Cities Service also supports the concept of multiple use and therefore respects the concurrent right and obligations of all users. We also feel the industry, within established guidelines, will take necessary steps to protect the environment to the best of its ability during the exploratory and development stages. As an individual company, we continue our pledge to operate both onshore and offshore facilities with serious and responsible regard for proper environmental considerations as well as consideration for others in the multiple use concept.] 4

Yours very truly,

CITIES SERVICE COMPANY

Jack R. Place
General Manager
U. S. Offshore Region

JRP/JVY&r

EXXON COMPANY, U.S.A.
POST OFFICE BOX 2180 · HOUSTON, TEXAS 77001

October 30, 1979

EXPLORATION DEPARTMENT
ALASKA/PACIFIC DIVISION
CRANDALL P. JONES
MANAGER

OCS Oil and Gas Lease Sale
Eastern Gulf of Alaska
Sale No. 55

Mrs. Esther C. Wunnicke, Manager
Alaska Outer Continental Shelf Office
Bureau of Land Management
P. O. Box 1159
Anchorage, Alaska 99510

Dear Mrs. Wunnicke:

Pursuant to notice in the Federal Register, Vol. 44, No. 197, October 10, 1979, the purpose of this letter is to comment on the DEIS for the captioned sale.

Exxon Company, U.S.A., believes that the draft statement adquately complies with requirements of the National Environmental Policy Act. Exxon also endorses statements made on behalf of the Alaska Oil and Gas Association at the public hearing held in Juneau October 26. We feel this OCS sale is in the national interest, will not result in unacceptable environmental degredation and should be held as scheduled.] 1

Very truly yours,

CDJ:nh

A DIVISION OF EXXON CORPORATION

SOUTHERN CALIFORNIA GAS COMPANY

WILLIAM L. COLE
Vice President

810 SOUTH FLOWER STREET • LOS ANGELES, CALIFORNIA
Mailing Address BOX 3249 TERMINAL ANNEX, LOS ANGELES, CALIFORNIA 90051

November 8, 1979

Bureau of Land Management
Alaska OCS Office
U. S. Department of Interior
P. O. Box 1159
Anchorage, Alaska 99510

RE: Draft Environmental Impact Statement - Lease Sale No. 55

Gentlemen:

We have reviewed the Draft Environmental Impact Statement for the proposed OCS Lease Sale No. 55 concerning acreage in the Eastern Gulf of Alaska and are submitting the following comments for your consideration.

As managers of the largest gas distribution utility in the United States, we are acutely interested in any opportunities for development of new natural gas supplies; most particularly, any which could be made available to the southern California market area. We are, therefore, pleased to note the attention paid to the prospects for natural gas development in the Lease Sale No. 55 D.E.I.S. However, we are concerned that there is serious consideration apparently being given to alternatives which could reduce the area offered for leasing and the volume of resources consequently made available for discovery and development.] 1

1. The Lease Sale Should Open The Maximum Possible Area to Exploration

We are concerned however, with any reduction in the area to be leased. It is anticipated that, by the time considered in the D.E.I.S. when gas production might be available (Table A-1 through A-6, Appendix A), affiliates of our company will have in operation on the southern California coast an LNG receiving terminal. This facility would be ideally suited to serve as a means of delivering Gulf of Alaska gas production to lower-48 energy markets. Obviously when one considers the high cost of any transportation system to move energy from this area, every effort should be made to realize the efficiencies brought about by larger volumes. This argues for as large a resource base as possible. Therefore, the larger the area made available for exploration and development by industry, the better the chance of locating sufficient resources to justify development.] 2

Pre-exploration resource estimates should not be the decisive criteria on which leasing decisions are based. It must be recognized that, before exploratory drilling has occurred, there is no way that anyone can determine (with assurance) the quantity of resource which an unexplored geologic province may contain.] 3

For example, it is well known that no one anticipated the size of the Prudhoe Bay Oil Field discovery until after the second productive well had been drilled on that structure. After all, the responsible company (the predecessor of Atlantic Richfield Oil Company) could have conserved tens of millions of dollars spent in the exploratory efforts on other Alaska North Slope prospects if the size and significance of the Prudhoe Bay structure had been accurately anticipated. Similarly, companies bidding on the Destin Dome feature in the Gulf of Mexico would have conserved many millions of dollars in bonus monies actually donated to the Federal Treasury if they had realized adequately the nature of the formations present in that structure prior to bidding. These facts are related to focus your attention on the questionable reliability of pre-exploratory resource predictions and a recommendation that, consequently, it is essential that as much acreage be made available for exploration as soon as possible so that the maximum resource can be located and developed to meet our nation's energy needs. 4

2. Construction of an LNG Plant Should be included for the Mean-Production - Level Scenario

On page 106 of the D.E.I.S. it is stated that the gas pipeline assumed to be routed through the Alsek River Canyon (to connect with the proposed ALCAN pipeline) is a proposal which applies to all alternatives with the exception of the "maximum" case, and that the "maximum" case assumes an LNG facility to be constructed at Monti Bay. We could find no explanation in the D.E.I.S. stating the basis for this decision proposing an LNG plant at Yakutat only in the "maximum" case. In fact, we strongly recommend that an LNG plant be considered as the proper means of transporting gas from the Eastern Gulf of Alaska area in both the "maximum" and "mean" production scenarios. Our principal reasons for this recommendation are two: 5

a. An LNG plant at Yakutat at the mean production scenario would be economically feasible.

b. The overall environmental impact related to such an LNG plant could then be compared with the proposed Alsek River gas pipeline in order to determine which mode of transportation is the more acceptable.

In support of our position that an LNG plant could be economically viable under the conditions assumed to represent the "mean" production scenario we point to the current Phillips-Marathon LNG project for export of Cook Inlet gas to Japan. This project involves approximately 150 million cubic feet of gas per day, a rate that would be exceeded for many years according to the gas production schedule described in the "mean" scenario (Table A-2, Appendix A). 6

The fact that an LNG plant would be acceptable to the local populace at Yakutat is verified by recognition of the lease granted to our affiliated company, Pacific Alaska LNG Co., by the Yak-Tat-Kwaan, Inc. (as described on page 80 of the D.E.I.S.). Construction of the LNG plant in the Yakutat area is described as having some ". . . moderate impact on the lifestyle of Yakutat over the proposed life of the project." (page 196). 7

This latter statement should then be compared with those included in the D.E.I.S. that describe the impact of the proposed gas pipeline alternative. For example, on page 163 the impact of the proposed pipeline route on "wilderness resources" is described together with the fact that location of any permanent construction in this area will necessitate favorable regulatory action by at least the U. S. Forest Service and, perhaps, other agencies concerned with Federal land use program. On page 24 the D.E.I.S. states: 8

> ". . . The most extensive and visually damaging portion of this alternative lies in the Alsek River Canyon construction option. The Alsek River Canyon is virtually untouched by man. Any activity within the area would permanently change its scenic quality."

These statements point up the desirability of considering both modes of gas transportation, LNG as well as pipeline, for the mean case scenario.

3. Legal Status of the Proposed Gas Pipeline Route

The statements in the D.E.I.S. (at pages 163 and 164) concerning construction of the proposed gas pipeline through the Alsek River Canyon raise some question about the ability to use this proposed route. It is indicated that the route passes through the Tongass National Forest and within proposed additions to the Tongass National Forest and the Glacier Bay National Monument. Graphic No. 10 (Land Status and Land Use) appears to indicate that lands along this route may be part of that withdrawn by the President in 1978 under terms of the Federal Antiquities Act. The final impact report should focus on whether a gas pipeline will be permitted along this route. 9

One other comment seems appropriate. When, in the future, your office undertakes the preparation of another D.E.I.S. involving the construction of LNG facilities in Alaska, we would welcome the opportunity to contribute any information we might have available to the preparation of that document. As stated above, we are vitally interested the development of additional domestic energy resources and would welcome the opportunity to contribute to that effort at as early a point in time as possible. 10

Thank you for your consideration of our comments and should you have any questions concerning these comments please direct them to the above address.

Very truly yours,

JFB:gem

NOV 5 3 PM '79

November 1, 1979

Dear Sir:

In response to the Draft EIS on the proposed OCS oil and gas lease sale in the Eastern Gulf of Alaska, I would like to point out something you seem to have missed. 1

Our business is rafting. Not long ago, rafting was a sport in which few participated, but today millions of Americans each year are seeking the out-of-doors on our nation's few remaining rivers. As a business, it has grown into a respectable giant.

Since 1976, I have been operating raft expeditions into the wilderness of the Alsek River. The Alsek River rates as the number one alpine river experience to be found any where in the world. A bold statement perhaps, but our company, SOBEK Expeditions has been exploring around the world to seek out the best of the remaining fragments of wilderness since 1973. No where else in the world do so many alpine elements combine as do the glaciers, the wildlife, the flora, and spectacular mountain peaks of the Alsek Valley.

Contrary to your statement (P 162) that you expect the "present low level of recreation use to continue..." the visitation of the Alsek Valley is doubling annually. In 1979, there were between 250 and 300 people who floated the Alsek. Its fame is rapidly spreading and the use will continue to grow in the next few years. It is truly a unique wilderness experience, that deserves protection. 2

The construction of a gas pipeline and access road would totally destroy the wilderness values of that magnificient region! 3

The statement (page 163, paragraph 6) "There would be no unavoidable adverse affects to recreation and tourism, assuming an enclave style of level and the Alsek pipeline service road being closed to the General Public." is totally wrong as it does not take into account the present and potential river use on the Alsek, and the destruction of that experience. 4

The failure of your research teams to consider river use as a majoy factor in recreation and trouism in the area has caused your draft EIS to be very inadequate in that category. It should be amended to show 5

a more truthful situation.

If there is any way I can be of further assistance, please feel free to contact me.

Sincerely,

Bart Henderson
251 E. Main Street
Vernal, Utah 84078
(winter address)

BH:kr

ALASKA OCS OFFICE ANCHORAGE, ALASKA
NOV 9 S 34 AM '79

30 Oct. 1979

To Whom it may concern:

We are unalterably opposed to the lease sale of offshore drilling tracts in the Gulf of Alaska.

This use is incompatible with the wild nature of so many hundreds of square miles in the area, and the possibility of oil spills has disastrous ramifications we feel it is essential to avoid. The beaches are wild and wonderful, frequented not only by local populations of wild animals but by hundreds of thousands of migrating birds. In May of 1977 we saw an estimated 100,000 arctic loons flying north near Lituya Bay. Many of these birds rest for brief periods in the offshore waters during their flight. We also saw countless thousands of other waterfowl, of many species. (see the 1978 Lituya Bay Report, National Park Service, Glacier Bay National Monument, for exact figures.)] 1

We have walked the beaches extensively from Dixon Harbor to Dry Bay and love the country dearly, the way it is. We will resist the possibility of oil damage with great exertion. We regard this land as public trust domain and feel it is of the utmost importance to preserve it in a wild state.] 2

Give Yakutat a break: Leave them alone.

Give Dry Bay and the Alsek-Tatsenshini a break: leave them alone.

Give Glacier Bay National Monument a break: leave it alone. And leave Hoonah, Elfin Cove, Lituya Bay and Dundas alone. These places are picturesque and unique and meaningful as they are, not coated in oil sludge.] 3

Leave the oil for future generations who may have the technology to extract it without potentially destroying the surrounding countryside. So not seek to ease the magnitude of impact by moving operations into Icy Strait: this is no place for tankers with its treacherous currents, frequent dense fogs and thousands of jewel-like coves and inlets ecologically fragile to the impacts of oil.

The wholesale exploitation of resources must have an end to it. We do not have the desperate need for oil the oil companies proclaim in order to justify these environmental disasters. We can eliminate the need for these programs through conservation and intelligent use of present energy resources.] 4

Leigh Smith, Council Member, Friends of Glacier Bay

Wende Dolstad

2435 Lafayette St.
Bellingham, Wa. 98225

PLEASE SEND DEIS for EASTERN GULF OF ALASKA SALE #55

ds

B.L.M. O.C.S. Office
P.O. Box 1159
Anchorage, Ak.
99510

ALASKA OCS OFFICE ANCHORAGE, ALASKA
NOV 9 S 34 AM '79

November 6, 1979

Dear Sirs,

I want to submit some additional written comments after hearing the testimony of others and the responses of the hearing officers in Juneau on October 26th in the Baranof Hotel.

In many places the DEIS speaks of "mitigating impacts" by adopting regulations and taking precautions (Appendix B, page 1 for example). I think that what the U.S.G.S. means is that these orders may reduce the possibilities of events that will have impacts; while perhaps less likely to occur, an event resulting in a spill will have the same impacts regardless of any regulations. I approve of the U.S.G.S. trying to think of ways they can reduce the likelihood of spills, but their wording should reflect the probable results of their efforts.] 1

The potential impacts of a major spill are unnacceptable. In my oral comments I mentioned the need to address the sum of the impacts and the need to foresee impacts beyond the immediate sale area. I recently have talked with another individual who has, as I have, see the migrating birds set down for a time on the water. An E.I.S. must address this type of information, if it isn't available, the Sale must be delayed at the very least.] 2

It does not make good sense to risk damaging an area until we know enough about the real risks to determine if they are worth the rewards.

The proposed sale #55 does not consider the risks posed by other oil related operations in the Northeastern Pacific. Nor does it consider the potential threat that it poses to the Eastern Gulf of Alaska in relation to oil transportation and drilling occurring elsewhere around the U.S. and that is having such terrible impacts there. The spectre of having major spills off every coast is not far way. We should begin to think of areas where we don't go out of our way to increase the possibilities of spills. An area like that of Sale #55, with its admitted high risks and low potential, is a good place to leave alone for now, if not forever.

The DEIS had no attached information on the B.L.M.- O.C.S. Address, the comment period, or the hearing dates and locations. This should be an integral part of the EIS. This is vital information for soliciting public response. Sufficient time should be given to the public through notices in the papers and on radio and TV, so the public can obtain the EIS and comment on it in time.] 3

Please put me on your mailing list for subsequent mailings of public notices and the EIS.

Sincerely yours,

Michael Macy

Michael Macy

Box 1692
Juneau, Alaska 99802

TELEPHONE COMMENTS SUBMITTED BY RON BALL, ALASKA DEPT. OF FISH AND GAME BIOLOGIST, YAKUTAT.

1. Page 63. Requested deletion of any reference to the glacier bear in the third paragraph. The glacier bear is not known to occur in the Icy Bay area.] 1

2. Page 66, paragraph d. Requested we include a statement that wolves scavenge the beach and tidal areas year-round.] 2

3. Page 66, paragraph e. Requested we delete the reference to muskrats.] 3

In addition, Ron requested we add the following comments regarding terrestrial mammals:

a. There is a substantial population of coyotes inhabiting the mainland and islands of Yakutat Bay. In addition, they frequent the beach and tidal areas.] 4

b. Red fox are found adjacent to the proposed lease area, and scavenge the beach and coastline.] 5

c. Wolverine occur throughout the Yakutat area and may be increasing in numbers. They frequent the beach and tidal areas.] 6

4. Page 86. The record kill of moose is cited in the fifth paragraph as 1979. This date is in error, and Ron will research his records to determine the correct date.] 7

5. Page 87. The first sentence regarding goat populations should be corrected to reflect that they are being closely monitored with the possibility that certain herds may be restricted by regulation if hunting pressures increase.] 8

The second and third paragraphs on page 87 are a discussion of brown bears in the Yakutat area and cite personal communication with Ron as a representative of ADF&G. Ron is concerned that the wording of these paragraphs do not accurately reflect the current situation with respect to the brown bear population and possible future actions of ADF&G. RON has been accumulating additional data and would like to assist in rewriting these paragraphs.] 9

I informed Ron that several staff members (including myself) would be visiting Yakutat within the next month to work with Jim Kohler on the final EIS. I will arrange to meet with Ron during that trip to finalize his comments.

Elaine Bratt

ALASKA OCS OFFICE ANCHORAGE, ALASKA
Oct 31 S 44 AM '79

ALASKA TROLLERS ASSOCIATION

P.O. BOX 8825
KETCHIKAN, ALASKA 99901

October 29, 1979

U.S. Department of the Interior
Bureau of Land Management
Alaska OCS Office
P.O. Box 1159
Anchorage, Alaska 99510

Dear Sir;

The Alaska Trollers Association wishes to comment on the proposed Outer Continental Shelf Oil and Gas Lease Sale Eastern Gulf of Alaska. Our concerns are the effects of chronic low level pollution and large spills on the rich ocean salmon resources, and the nearshore and freshwater habitat populations and the effects of development on commercial fishing activities.] 1

The primary focus of discussions on impacts is the effect on the commercial fisheries of the city of Yakutat and its residents. There is little or no discussion of the effects the pollution and development activities will have on the power troll fleet fishing in districts 181, 189, 116, and 157. This fleet delivers primarily to Pelican and losses to this commercial fishery would substantially affect the community of Pelican. As many as 200 trollers fish these districts in a season, and would be affected. This does not include the longline and halibut fishermen. Few of these fishermen live in Yakutat. Thus the emphasis on effects on commercial fishing in Yakutat does not adequately indicate impacts on these other people.] 2

There is also no discussion of physical interaction between the offshore fishing fleet and drilling activities. The troll and halibut fleets are in the area from May through September. There could be considerable conflict between fishing and drilling operations.] 3

The Alaska Trollers Association endorses Alternative IV with a deletion of the gas pipeline and road up the Alsek River. As the EIS states this alternative reduces the impacts on fish species the most. In case of an oilspill this alternative greatly reduces impacts on salmon spawning areas and nearshore rearing areas. Because of the importance of the Alsek River for salmon production we feel a gasline and road would have serious impacts on its production capability. The Alaska Trollers Association feels that Alternative IV more nearly balances the needs of the United States for both oil and gas and fish resources.] 4

Thank you for the opportunity to comment.

Sincerely yours,

Sharon Newsome

Sharon Newsome

SN/vs

THE AMERICAN CETACEAN SOCIETY
NATIONAL HEADQUARTERS

November 19, 1979

Director
Bureau of Land Management
Department of the Interior
Washington, D.C. 20240

Dear Sir:

I am enclosing our comments on the federal/state oil and gas lease sale in the Eastern Gulf of Alaska. Our people have spent a great deal of time preparing the enclosed material, and we deeply appreciate having the opportunity to present our viewpoint.

Sincerely,

Mason Weinrich
National Environmental Committee

P. O. BOX 4416 • SAN PEDRO, CALIFORNIA 90731 • (213) 548-6279

THE AMERICAN CETACEAN SOCIETY
NATIONAL HEADQUARTERS

COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR THE PROPOSED FEDERAL/STATE OIL AND GAS LEASE SALE
IN THE EASTERN GULF OF ALASKA

The following comments are respectfully submitted to the Bureau of Land Management by the American Cetacean Society, a national, nonprofit organization whose major goal since 1967 has been the protection of marine mammals. We strongly support modifications to the proposed sale to insure protection of the various cetacean species that are found in or near that area. These modifications would include deleting the North-Eastern tracts, installing a pipeline, and several months without drilling at all.

P. O. BOX 4416 • SAN PEDRO, CALIFORNIA 90731 • (213) 548-6279

The latest planned lease sale by the Bureau of Land Management's Outer Continental Shelf office is the Eastern Gulf of Alaska (sale No. 55). After carefull review of the Draft Environmental Impact Statement (DEIS), the American Cetacean Society feels it necessary to submit commentary on those aspects of the DEIS that deal with the order CETACEA (whales, dolphins, and porpoises).

The DEIS contains many flaws in this aspect, but none is as bad as the format in which the habitats of these animals are presented in graphics number 8 and 9. Little information is actually presented in these charts, which show nothing but a broad band that take up the majority of the aquatic part of the map. No specifics as to where each species travels in relation to each other, or to the lease area, is actually given. This is essential information that needs to be presented in order to make sound management desicions. Further, this information is available. As part of the Outer Continental Shelf Environmental Assessment Program, the abundance of all marine mammals has been investigated in detail in this area. Fiscus et al. (1976) gives an abundance of information on this, as do several other teams involved in the program. 1

With the many species of cetaceans existing near the lease sale area, how can a usefull yet comprehensible map be presented? Townshend (1935) used a format that involved dots of different colors for each species, putting a dot wherever a whale had been reported. As a result, species tendencies show up well. This same technique could be used well with the problem in question, conveying much more information than is presently conveyed. 2

By examining graphics two and three of the DEIS, one can see a problem not mentioned in the statement. The drift buoy trajectories shown on graphic No. 2 would seem to indicate that water often flows from the lease sites along the high concentrations of invertebrate organisms (as shown in graphic No. 3). In the event of a major spill, or even due to incidental oil release, baleen whales that feed on these organisms will have a high probability of exposure to some amount of oil. Further, it is not unlikely that this oil will in fact be ingested, since these are the feeding grounds. This may have a deleterious effect on the endangered blue whales and right whales, as well as other endangered species. 3

Another effect not taken into account is the proneness of the North Pacific Right Whale to ingestion of oil due to its feeding habits. This animal is a filter-feeder that skims the surface of the water with its mouth opened, hoping to trap various invertebrate organisms in its baleen plates. Since it does feed primarily on the surface , any oil that is lying on the surface may be encountered by these animals. This would mean that the oil would encounter the baleen plates, which may be rendered ineffective by an oil covering. If this is not the case, the oil may then be ingested. 4

To further their proneness, Watkins and Schevill (1976) have presented evidence that the North Atlantic Right Whale primarily uses sight to navigate with. This would make fouling of the optical area by oil a serious hazzard to both feeding and navigation, especially if the animal has no other way of orienting. Since this species is 5

extremely endangered to start with, this is a problem to contend with.

This same problem may be an important question for other species of baleen whales as well. Whether or not mysticetes have any kind of echolocation system is currently under debate. There is some evidence of such a system in blue whales (Peter Beamish recorded a series of ultra-sonic calls from an ice-trapped blue whale), but most species seem not to have this ability. On top of that, Allen Mead has found the eyes of mysticetes to be complex, well adapted, and well developed. Such a development would not be necessary unless the organ was of some importance. Nowhere in the DEIS is this discussed. 6

Table II.B.4-1 indicates that there is a seasonal abundance of about twenty humpback whales in or near the lease area. Results from the Outer Continental Shelf Assessment team of Tilleman and Hall (Research Unit 481) reported seeing 282 humpbacks in Prince William Sound in 1977. This area is about two hundred miles northwest of the sale area, and it is possible that these whales would migrate through or near the lease area. 7

Humpbacks may be succeptable to oil spills for several reasons. Charles Jurasz has reported seeing this species "sleeping," when the individual lies motionless at or near the surface of the water for a prolonged period. During this type of activity breathing occurs regularly, possibly unconsciously. Should oil-fouled water be present at the surface, it is likely that the oil would, to some degree, get into the blowhole. This could possibly lead to pneumonia, and death. 8

Jurasz also believes that humpbacks are sensitive to boat traffic in their summer grounds. He has noted a decline in the numbers of animals that are spending the season in Glacier Bay, a known summering ground for the species. He believes this to be due to an increase in the ship traffic in the region. 9

Gray whales may also try to avoid an area because of increased boat traffic and/or noise. Dohl (1979) has reported a definite trend by gray whales to migrate further offshore in Northern California. This is probably due to a large increase in boat traffic of all kinds, including whale-watching and shipping. Further, these animals are known to desert a breeding lagoon due to a major sudden increase in boat traffic. This was shown when no whales appeared one year in a lagoon where salt shipping was being carried on for a season (Marx, 1966). Although this type of avoidance reaction has not been shown on a feeding ground, it is possible that such a reaction would take place. 10

A deficiency in the DEIS lies in the population estimates of the gray whale. The population is listed as 11,000 worldwide. This data is from 1971, however, when the population probably was at that level. The results from the latest population counts are higher, however. Reilly (1979) shows a minimum of 16,500 gray whales wintering in California and Mexico, with 18,000 being a more accurate count. This is confirmed by Braham (1979) who reported a minimum of 16,500 animals that crossed Unimak Pass in the latest season. This revised data should be placed in the DEIS. 11

Also neglected in the DEIS is the period of the year that fin whales are found in the lease sale area. Although the DEIS includes a discussion of when the breeding season for this species is, nothing is said as to what part of that is spent in the leasing area. 12

In the worst case assumptions for the endangered whales, there are two items that should be corrected or explained. The first is assumption No. 6, which states there is a medium chance that noise will interfere with whale communication. This should, in fact, be listed as unknown, as there is little data on the reactions of whales to noise. The only other questionable thing in the worst case assumptions is where the figures of ten percent and fifty percent come from in assumption number 16. An explanation of this would be worthwhile. 13 14

Perhaps the most startling thing about the DEIS is that nowhere are the impacts of the project on Killer whales, belugas, goose-beaked whales, bottlenosed whales, Bering sea beaked whales, Dall's porpoise, North Pacific Right whale dolphin, North Pacific white sided dolphin, or harbor porpoises discussed. The impacts section of the statement (III.A.2.a) has them grouped with the endangered cetaceans. Although many of the physiological effects are the same,the overall impacts will differ due to the different habits of these small odontocetes. Grouping them with the endangered whales is, therefore, inappropriate. 15

Dall's porpoise have habits which would leave them likely candidates to be found in the lease area. Morejohn (1979) reports that these animals stay in depths over 100 fathoms (183 meters), yet they stay within 100 miles of shore. This is exactly where the lease area is located, making them prime targets for both major spills and incidental releases. 16

The beaked whales are also very sensitive. Little if anything is known about the population status or natural history of this class of cetaceans. Any deleterious effect on populations may be very severe, especially on a possibly sensitive species like the Bering Se[illegible]ked whale. 17

A cetacean that seems to be sensitive to water contaminants of all kinds seems to be the harbor porpoise. Prescott (1979) examined tissue samples from stranded animals and noted high levels of PCBs, DDT, and heavy metals. Coupled with the fact that strandings have increased greatly in recent years, this may indicate a prime sensitivity. This species may also be used as an evironmental indicator. 18

The Eastern Gulf of Alaska is an area with a highly diverse species concentration with regard to cetaceans. Some of these (Blue, right, and humpback) are highly endangered species whose welfare must be protected. 19

We, the American Cetacean Society, feel that this can be done. By deleting the nearshore sale areas, the gray whale can be protected to some degree. On top of this, putting in a pipeline will significantly reduce the boat traffic in the area in the long run. The greatest, and most essential, precatution of all, however, is a halt to drilling during the months of peak migration and feeding. This will reduce the risk of an oil spill while the whales are in the area, prevent any avoidance response to noise that they may have, and allow undisturbed feeding. This would mean losing only about three months out of the year, while affording the maximum of protection to the endangered species of whales found in the area. 20

WHALE CENTER
3929 Piedmont Ave. Oakland, California 94611 --(415)654-4892

ALASKA OCS OFFICE
ANCHORAGE, ALASKA
NOV 14 8 AM '79

November 9, 1979

Home office of Whale Center International
Other offices in: France, Canada, Mexico, Brazil, Japan

Manager, Alaska OCS Office
BLM
620 E. 10th Avenue
P.O. Box 1159
Anchorage, AK 99510

Dear Manager:

We are taking this opportunity to submit to you comments on the draft environmental impact statement for the proposed oil and gas lease sale in the Eastern Gulf of Alaska. In sum, we believe that due to the especially harsh conditions of the sale area and to the presence of a number of endangered species in the area, the sale should be delayed until adequate studies can be completed to inventory wildlife in the area, their needs, and potential impacts from OCS development.

The attached comments were prepared by Dr. Irene B. Fabrikant, a staff member at the Whale Center.

We thank you for the opportunity to comment upon the DEIS and ask that you take our comment under serious consideration in the final evironmental statement.

Sincerely,

Maxine McCloskey,
Executive Director

MW:mw

Comments on
Draft Environmental Impact Statement:
Proposed Outer Continental Shelf
Oil and Gas Lease Sale No. 55
Eastern Gulf of Alaska

Prepared

by

Dr. Irene B. Fabrikant

The Whale Center
3929 Piedmont Avenue
Oakland, CA 94611

It is becoming increasingly apparent that if society's various needs are to be met, basic societal value judgments must be made. Society, as a whole, must become involved in a rational discussion of the alternatives to determine what price it is prepared to pay for maintaining a highly evolved technology and life style when part of this price is the inevitable destruction of irreplaceable natural resources--our wilderness areas and living creatures in the plant and animal world, all of which serve to enhance the quality of our lives in a manner that is difficult to quantify. 1

The Draft Environmental Impact Statement (DEIS) for the proposed outer continental shelf (OCS) oil and gas lease sale No. 55 in the Eastern Gulf of Alaska provides certain projected production data. We would like to use the production estimates in computations to correlate and interpret the total oil and gas yield derived from this proposed sale with respect to 1) our annual energy requirements, 2) our dependence upon foreign oil imports, and 3) our energy conservation measures. 2

A sense of urgency to proceed with development is implied in the introductory section of the DEIS: "Action to expand U.S. energy production, such as implementation of this proposed lease sale, is necessary now if we are to ensure that sufficient energy sources will be available in the future." The DEIS also states that "to delay or eliminate in part or in whole the proposed eastern gulf sale would reduce future OCS oil and gas production, necessitate escalated imports of oil and gas, and/or require the development of alternate energy sources to replace the energy resources expected to be recovered if the proposed sale takes place." (p. 28) Moreover, according to the President's message on the environment of August 2, 1979, the administration's latest energy program proposals, based in large part on conservation and increased domestic energy production, would reduce our dependence upon foreign oil by 4.5 million barrels per day by 1990. 3

1) Annual energy requirements. The total (mean) crude oil (0.45×10^9 barrels) and natural gas (1.25×10^{12} cf) production from the proposed sale over the 35-year production schedule, according to U.S. Geological Survey (USGS) estimates, will be 5.86×10^{15} BTU equivalent (Table I.B.2.a-1). The U.S. energy demand in 1985, taking into account either accelerated supply plus conservation measures, or base case only, is estimated to be 96.3 and 102.9 quads respectively (1 quad = 10^{15} BTU) (Tables I.B.2.a.-2, 4

I.B.2.a.3). Thus the entire 35-year production yield of this sale represents approximately 6% of a one-year energy demand in the United States. It would seem that an enormous amount of effort will be expended over the 35-year interval at an irreparable cost to our environment in order to satisfy only 6% of a single year's domestic energy requirements. 1

2) Foreign oil imports. Based on February 1977 figures, U.S. imports of petroleum and petroleum products were 15.79×10^{15} BTU equivalent (7.724×10^6 barrels/day) (DEIS, p. 14). The entire 35-year production from this sale (i.e., 5.86×10^{15} BTU equivalent) comprises approximately 37% of a single year's foreign oil imports. To stress the potential monetary savings in our foreign balance of payments or problems of political instability seems fallacious in light of the small proportion of savings in potential oil imports represented by the proposed sale. 5

3) Energy Conservation measures. The Project Independence Report of the Federal Energy Administration concerns itself with vigorous conservation alternatives. It estimates that conservation alone could result in a 2.2 million barrels per day reduction in petroleum demand by 1985 (DEIS, p. 30). This is equivalent to 4.50×10^{15} BTU/year. Again, the 35-year production life of the proposed sale will yield 5.86×10^{15} BTU. This represents 3.7% of our potential annual conservation capability. Or in 476 days of conservation measures as outlined in the Project Independence Report, we could save energy equivalent to that which would be produced in the 35-year production life of the proposed sale. Thus, it is clearly essential that every effort be made by all segments of society, both in the private and in the public sector, to promote and carry out all possible energy conservation measures and minimize wasteful consumption habits. 6

In view of the inherent risks and often unavoidable and irreversible damage to the bio-ecosystem inherent in all OCS oil and gas exploration and production programs it is imperative that we try to interpret the risk/benefit relationships from every viewpoint. The above three elementary sets of calculations shed light on the simplistic arguments posed by proponents of OCS oil and gas exploration. Phrased in simpler terms, the calculations reveal that in order to stop oil importation for one year, Sale 55 would have to operate for 105 years, or 105 comparable OCS sales would have to operate for one year, or three comparable OCS sales would have to operate for 35 years; 2) to provide the equivalent energy required by the U.S. in 1985 only, OCS Sale 55 would have to operate for 560 years, or 560 comparable OCS sales would have to operate for one year, or 16 comparable OCS sales would each have to operate for 35 years: 3) to provide energy 7

equivalent to that which might be provided by conservation measures in one year, Sale 55 would have to operate for 945 years, or 945 comparable OCS sales would have to operate for one year, or 27 comparable OCS sales would each have to operate for 35 years. Interestingly, conservation measures alone would provide approximately one third the energy equivalent obtained by importation in any one year. 7

Perusal of the graphics drawn up for the proposed sale make it difficult for a biologist to approve the proposed lease sale. The meteorological conditions in the Gulf of Alaska are extraordinarily severe. The Gulf is the terminal of the longest over-water storm track in the world. Frequent storms with highly variable gusty winds, reaching 100 knots or more, move rapidly through the region. These may blow counter to prevailing wave directions producing steep rough seas generating waves 9m and higher (12-20m waves have been reported). These combine to form a frequently changing high energy environment in the proposed lease sale area. Such violent instability would make routine operation extremely hazardous and definition of precise spill trajectories very difficult to determine. 8

According to the USGS the leasing of tracts in the sale area will result in an expected number of 3 spills. The probability that land will be contacted by one or more spills within 30 days is 0.84. The season of the year will have an impact on oil export, e.g., during spring and summer months the oil will have a greater tendency to reach the shore and be retained by the coastal zone for one year or more. The risk of spills resulting from offshore loading and transportation is 30 times that arising from production activities. Contributing to oil spill risk in this area are unstable seismic conditions and geologic and tectonics formations.

The cost effectiveness of the six alternatives bears comment. All alternatives, except for the No-Sale proposal, will produce the same amount of oil and gas over the life of the operation, despite variation in approach. The total cost of Alternatives I and IV is estimated at $3,577.4 million or $3.42/barrel, of Alternative V $3,648.4 million or $3.49/barrel and of Alternative VI $3,409.4 million or 3.25/barrel. 9

Since a general overview of the environmental impact analysis indicates that Alternative VI has the fewest biological impacts in comparison to other alternatives, it would appear that this is the most reasonable of the alternatives, except for no sale, from a biological point of view. Somewhat increased impacts exist under Alternative VI on bottom fisheries and on endangered migrating whale species which might come into contact with spills from offshore loading facilities, however.

As a result, even Alternative VI presents, in our opinion, excessive risks, since so little is known of the habits, behaviors, presence and needs of endangered whales in this area.

The proposed lease sale impacts considerably on all wildlife indigenous to or passing through the region. In too many instances throughout the DEIS statements are made concerning a lack of knowledge aoout a given species' biology, feeding and habitat needs, migration routes or the effect of various disturbances in the food chain, of noise levels, physical obstructions (e.g., rigs), vessel traffic, human intrusion, etc., on its activities. The available information is insufficient to predict and to detect the precise nature and extent of possible impacts. Second order events which result in habitat changes (e.g., changes in food web sources) might be more deleterious than direct first order events resulting from direct contact with oil and gas operations. 10

The proposed sale may well impact on seven species of endangered whales, viz., the humpback, gray, fin, right, sei, sperm, and blue. Little information is available about most of these. The endangered Aleutian Canada goose passes over the sale area in its migration, but the precise route and use areas are unknown. Among the 22 marine mammals which frequent the region, barbor seals are abundant, occurring in a number of areas; in particular, they are found in spectacular numbers in Icy Bay (which would be severely impacted by Alternative V). Sea otters inhabit shallow coastal waters and are at greatest risk to fouling by oil and destruction of food sources. Sea lions are distinguished by their affinity for specific defined locations used as breeding and pupping rookeries and hauling areas. Of 202 known sea lion rookeries in Alaska, 91 are located in the northeast Gulf of Alaska. These could all be severely impacted by the proposed sale. A number of other species of whales, including the beluga, killer, and beaked, the Dall's and harbor porpoises, the norht Pacific white-sided dolphin and the northern right whale dolphin, occur in varying numbers, but the precise patterns of movement, migration, and distribution are unknown. Direct damage due to oil ingestion, or coating, or indirect damage by means of contamination or disruption of food sources or breeding habits, and factors such as noise and human disturbance all may well contribute to disrupt the natural balance of these animals. 11

Disruption of food sources could critically endanger the gray whale, for example, since these whales feed mostly during the summer and fall when in northern waters. Stress 12

from food supply disruption could interfere considerably with behavioral and phyisological patterns.

Consideration of the proposed sale should be delayed until the current or proposed research programs concerning questions vital to a number of endangered and other wildlife species and their ecosystems can be designed, completed, reviewed, interpreted and evaluated by scientists with expertise in a variety of fields. For example, the New York OCS office is sponsoring studies to assess impacts of noise and oil on cetaceans, but these will take 2-3 years to complete. Information is required on rates of recovery for disturbed systems based on identification of critical high risk organisms and sensitive steps in the food chain. Current studies by the Naval Arctic Research Laboratory will only provide some of the information identfied by the National Marine Fisheries Servies as being necessary to determine possible impacts on gray whales, for example. It is essential that the results of such studies be in hai before we undertake a further threat to our environment. 13

The total lack of information in the DEIS concerning proposed oil and gas exploration in other Alaskan OCS regions makes it impossible to knowledgeably and rationally discuss the proposed sale since it is not an isolated event in a vacuum setting. It is imperative to consider the impacts of sale 55 in conjunction with superimposed simultaneous impacts and cumulative adverse effects on the environment. Illustrative graphics presenting geographical distribution and anticipated yields of oil and gas from other sales should be included in the DEIS of this sale and all other sales, particularly in frontier regions. 14

In summary, before approval for this or any other OCS lease sale is granted, it behooves us to assess all possible known or predictable risks by designing and mounting appropriate studies, evaluating the results in detail, and permitting sufficient time for independent scientific discussion and review. In light of the sever conditions which the sale region will present current development technology and therefore a number of endangered and other wildlife species, such studies and review are of the utmost importance. 15

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APPENDIX A

PETROLEUM DEVELOPMENT SCENARIOS AND BASIC ASSUMPTIONS UTILIZED TO DEVELOP THE ALTERNATIVES INCLUDING THE PROPOSAL

Introduction: The following pages present the 3 oil and gas development scenarios which describe the proposal as well as 2 additional scenarios which describe the alternatives to the proposal. These scenarios have formed the basis for the description of the Alternatives Including the Proposal (sec. I.A. and B.), Basic Assumptions Regarding Causes of Possible Impact Resulting from the Alternative Including the Proposal (sec. III.A.1.), and Estimation of Direct Employment and Description of Basic Assumptions Utilized (Appendix E).

The mean resource estimate and scenario represent a reasonable set of events given the information available today and the assumptions used. The mean scenario thus constitutes the "base case" receiving the relatively greater weight or focus of environmental analysis throughout this environmental statement. The 95 percent and 5 percent scenarios represent extremes in the probabilistic sense, and thus are analyzed in lesser detail. These scenarios, along with alternatives to the proposed action and other issues of concern, are not ignored, however. Their significant environmental effects are noted and discussed in appropriate sections of this statement.

Exploration Field Development and Production Assumptions: Scenarios (5 percent, mean and 95 percent cases representing the proposal and the alternatives), portraying timing, facility investment, and production assumptions are shown on tables A-1 through A-3. In addition, the following assumptions apply:

To be economic, i.e., for development to occur, the 95 percent resource level must be discovered in a maximum of 1 field. Development would not occur without the estimated amount of associated gas.

Drilling would occur year round.

Semi-submersible, heavy-duty rigs would be employed exclusively in exploratory drilling.

Each exploratory well is assumed to require 134 days, on average, to complete (see Technical Report Number 17, "Monitoring Petroleum Activities in the Gulf of Alaska," Dames & Moore, August 1978, pp.4-5).

Exploratory wells would range in depth from 14,000 to 17,000 ft, with an average of 15,000 ft.

Exploration support activities would make maximum use of existing, or modified, facilities, i.e., Yakutat, Cape Yakataga, and Seward.

Production and service wells would range in depth from 9,000 to 17,000 ft, with an average of 15,000 ft.

One service well per 4 production wells would be drilled.

Well workovers would begin in the fifth year of each well's operation, on average, and proceed on a 4- or 5-year cycle after that.

One rig per production platform (though not necessarily the same rig) would accomplish all production related drilling.

Production platforms would be steel with legs held to the sea floor by pilings. The platforms would be built on the U.S. west coast or in Japan and would be towed to the reservoir site in the sale area.

Oil production would probably be pipelined to shore to a tanker shipping terminal, and would be shipped at the rates shown in the following tables. Gas, if uncommercial, would be shut in.

One oil shipment terminal would be required in all cases, and storage would equal 5-10 days of production--most probably 6 days.

The onshore oil pipeline would not exceed 50 mi in length. Onshore gas pipeline would be about 150 mi long following the route described above. The oil pipeline diameter would range from 18-22 in and the gas pipeline diameter will range from 10-20 in.

No offshore pipeline laying problems are anticipated. If pipeline is buried, excavation with recovering would disturb 7 acres per mile.

No platforms will be utilized strictly for pipeline systems.

The oil pipeline onshore would require a maximum of 350 acres of right-of-way. The oil terminal would need the following areas:

95-percent Case	55 acres
Mean Case	90 acres
5-percent Case	140 acres

The gas pipeline onshore under the maximum case would require a maximum of 1050 acres for right-of-way.

The gas treatment plant is assumed under the maximum case to be located on the platform nearest shore. Capacity would match the peak flow as shown in the attached tables.

The local operations onshore, supply/support base, would probably be located at Yakutat. The associated supply yard would require 30-60 acres.

There would be no onshore separation facilities nor oil pumping stations.

The cost to transfer the oil from platforms to tankers via the oil terminal would be as follows:

(continued)

Table A-1
Northern Gulf of Alaska
95 Percent Scenario (Minimum Case)
One Oil Field with Associated Gas
Estimated Development Scenario and Schedule of Investment and Production--continued

	Exploration and Delineation Wells			Platforms and Equipment		Production and Service Wells			Workover Wells		Onshore Supply Support Facilities		Trunk Pipelines		Terminals		Production		
Year	No	Cost	Rigs	No	Cost	No 1/	Cost	Rigs	No	Rigs	No 2/	Cost 3/	Miles 4/	Cost 5/	No	Cost	Operating Cost	Oil MMbbls	Gas B cf
2010									1	1							7.7		12.0
2011									1	1							7.7		11.2
2012									1	1							7.7		10.4
2013									1	1							7.7		9.7
2014									1	1							7.7		9.1
2015									1	1							7.7		8.5
2016									1	1							7.7		7.9
2017									1	1							7.7		7.4
2018									1	1							7.7		7.0
2019									1	1							7.7		6.5
2020									1	1							7.7		6.2

Table A-1
Northern Gulf of Alaska
95 Percent Scenario (Minimum Case)
One Oil Field with Associated Gas
Estimated Development Scenario and Schedule of Investment and Production

Year	Exploration and Delineation Wells			Platforms and Equipment		Production and Service Wells			Workover Wells		Onshore Supply Support Facilities		Trunk Pipelines		Terminals		Production		
	No	Cost	Rigs	No	Cost	No 1/	Cost	Rigs	No	Rigs	No 2/	Cost 3/	Miles 4/	Cost 5/	No	Cost	Operating Cost	Oil MMbbls	Gas B cf
1980	Sale - June 1980										3	5							
1981	1	17.3	1																
1982	2	34.6	2																
1983	3	51.9	2									5							
1984	2	34.6	2																
1985	1	17.3	1	1	181.2														
1986													100	103					
1987						11	71.5	1					100	103	1	85			
1988						11	71.5	1					60	62			16.9	11.7	14.3
1989						11	71.5	1									33.8	22.2	28.5
1990						6	39.0	1									47.6	29.0	40.2
1991																	47.6	25.3	40.2
1992									3	1							47.6	21.8	40.2
1993									4	1							47.6	18.9	40.2
1994									4	1							47.6	16.5	40.2
1995									4	1							47.6	14.5	39.4
1996									4	1							47.6	12.8	37.3
1997									4	1							47.6	11.3	34.1
1998									4	1							47.6	10.1	30.9
1999									4	1							47.6	9.0	28.0
2000									4	1							47.6	8.1	25.5
2001									4	1							47.6	7.3	23.2
2002									4	1							47.6	6.6	21.2
2003									4	1							47.6	6.0	19.5
2004									4	1							47.6	5.4	17.9
2005									4	1							47.6	4.9	16.5
2006									3	1							47.6	4.5	15.2
2007									3	1							47.6	4.1	14.0
2008									3	1							7.7	-0-	13.0
2009									1	1									

Continued

Table A-2
Northern Gulf of Alaska
Mean Scenario
Estimated Development Scenario and Schedule of Investment and Production

Year	Exploration and Delineation Wells			Platforms and Equipment		Production and Service Wells			Workover Wells		Onshore Supply Support Facilities		Trunk Pipelines		Terminals		Production		
	No	Cost	Rigs	No	Cost	No[6/]	Cost	Rigs	No	Rigs	No[2/]	Cost[3/]	Miles[4/]	Cost[5/]	No	Cost	Operating Cost	Oil MMbbls	Gas B cf
2012									4	2							15.4		19.6
2013									4	2							15.4		18.2
2014									4	2							15.4		17.0
2015									4	2							15.4		15.9
2016									4	2							15.4		14.9
2017									4	2							15.4		14.0
2018									4	2							15.4		13.2
2019									4	2							15.4		12.4
2020									3	2							15/4		11.6
2021									2	2							15.4		11.0
2022									1	1							15.4		10.4
2023																	1.4		0.9
Total	14	268.8		2	362.2	70	588	150			3	10	260	268	1	125	1955.4	450	1250
Average Annual Production																		23.7	35.7
Peak Production (Mbbls/D and MMcf/D)																		140.3	198.1

All costs assume an "as installed" basis in millions of 1978 dollars.
Source: USDI, 1979a; BLM/Alaska OCS Office, 1979; Santa Fe Engineering and Construction Co., 1979; and Dames and Moore, 1979.

Table A-2
Northern Gulf of Alaska
Mean Scenario
Estimated Development Scenario and Schedule of Investment and Production

Year	Exploration and Delineation Wells			Platforms and Equipment		Production and Service Wells			Workover Wells		Onshore Supply Support Facilities		Trunk Pipelines		Terminals		Production		
	No	Cost	Rigs	No	Cost	No 6/	Cost	Rigs	No	Rigs	No 2/	Cost 3/	Miles 5/	Cost 5/	No	Cost	Operating Cost	Oil MMbbls	Gas B cf
1980	Sale June, 1980																		
1981	2	38.4	2								3	5							
1982	4	76.8	2																
1983	4	76.8	2									10							
1984	3	57.6	2																
1985	1	19.2	1	2	362.2								100	103					
1986													100	103					
1987						10	84.0	2					60	62	1		125		
1988						18	151.2	2									30.9	19.2	23.2
1989						18	151.2	2									61.8	36.4	46.5
1990						10	84.0	2									92.7	51.2	69.7
1991						14	117.6	2									96.1	46.9	72.3
1992									5	2							96.1	40.6	72.3
1993									6	2							96.1	35.3	72.3
1994									7	2							96.1	30.9	72.3
1995									7	2							96.1	27.2	71.1
1996									7	2							96.1	24.0	67.8
1997									7	2							96.1	21.3	62.7
1998									7	2							96.1	19.0	56.9
1999									7	2							96.1	17.0	51.7
2000									7	2							96.1	15.3	47.1
2001									7	2							96.1	13.8	43.0
2002									7	2							96.1	12.4	39.4
2003									7	2							96.1	11.3	36.2
2004									7	2							96.1	10.3	33.3
2005									6	2							96.1	9.4	30.7
2006									5	2							96.1	8.5	28.3
2007									4	2							15.4		26.2
2008									4	2							15.4		24.3
2009									4	2							15.4		22.6
2010									4	2							15.4		21.0
2011									4	2									

Table A-3
Northern Gulf of Alaska
Five Percent Scenario (Maximum Case)
Estimated Development Scenario and Schedule of Investment and Production

Year	Exploration and Delineation Wells			Platforms and Equipment		Production and Service Wells			Workover Wells		Onshore Supply Support Facilities		Trunk Pipelines		Terminals[8]		Production		
	No	Cost	Rigs	No	Cost	No[7]	Cost	Rigs	No	Rigs	No[2]	Cost[3]	Miles[4]	Cost[5]	No	Cost	Operating Cost	Oil MMbbls	Gas B cf
2012									9	2							29.2		35.8
2013									9	2							29.2		33.3
2014									9	2							29.2		31.0
2015									9	2							29.2		28.9
2016									9	2							29.2		27.0
2017									9	2							29.2		25.3
2018									9	2							29.2		23.7
2019									9	2							29.2		22.2
2020									6	2							29.2		20.9
2021									3	1							29.2		19.6
2022																	16.6		10.5
2023																			
2024																			
2025																			
Total:	20	384		3	607.2	128	1075.2		301		3	15	120	124	2	844	3463.8	800	2250
Average Annual Production																		40.0	66.2
Peak Production (Mbbls/D and MMcf/D)																		231.5	374.2

All costs assume an "as installed" basis in millions of 1978 dollars.
Source: USDI, 1979a; BLM/Alaska OCS Office, 1979; Santa Fe Engineering and Construction Co., 1979; and Dames and Moore, 1979.

Table A-3
Northern Gulf of Alaska
Five Percent Scenario (Maximum Case)
Estimated Development Scenario and Schedule of Investment and Production

Year	Exploration and Delineation Wells			Platforms and Equipment		Production and Service Wells			Workover Wells		Onshore Supply Support Facilities		Trunk Pipelines		Terminals[8]		Production		
	No	Cost	Rigs	No	Cost	No[1]	Cost	Rigs	No	Rigs	No[2]	Cost[3]	Miles[4]	Cost[5]	No	Cost	Operating Cost	Oil MMbbls	Gas B cf
1980	Sale June, 1980																		
1981	3	57.6	2								3	5							
1982	5	96.0	3																
1983	6	115.2	4																
1984	3	57.6	2									15							
1985	2	38.4	2	2	404.8														
1986	1	19.2	1	1	202.4								60	62	2	312			
1987						18	151.2	2					60	62		312			
1988						27	226.8	3								220			
1989						27	226.8	3									30.9	19.1	24.1
1990						27	226.8	3									77.2	45.6	60.3
1991						27	226.8	3									123.6	68.8	96.4
1992						2	16.8	1									163.0	84.5	127.2
1993									7	2							175.0	81.1	136.6
1994									10	3							175.0	70.4	136.6
1995									13	3							175.0	61.2	136.4
1996									13	3							175.0	53.6	134.2
1997									13	3							175.0	47.1	128.8
1998									13	3							175.0	41.6	120.4
1999									13	3							175.0	37.0	110.0
2000									13	3							175.0	33.0	99.5
2001									13	3							175.0	29.5	90.2
2002									13	3							175.0	26.5	82.0
2003									13	3							175.0	23.9	74.7
2004									13	3							175.0	21.6	68.2
2005									13	3							175.0	19.6	62.5
2006									13	3							175.0	17.8	57.3
2007									11	3							175.0	16.2	52.7
2008									9	2							47.9	1.9	48.6
2009									9	2							29.2		44.9
2010									9	2							29.2		41.6
2011									9	2							29.2		38.5

95-percent Case	85 cents/bbl.
Mean Case	60 cents/bbl.
5-percent Case	45 cents/bbl.

Note that the gas system under the maximum case is assumed to be owned or leased by the gas pipeline company, and gas sales would occur on the platforms after primary separation from oil has taken place. Any recovered liquids would be sold back and reinjected into the oil company's crude line.

Supply boats and helicopters would move supplies and personnel between shore and platforms. The fleets would total 2-8 units each.

There would be no site pads nor road building needed for the oil company operations.

Each well would require about 200 cu yds of commercial mud (dry basis) with more than half being barite and bentonite. Also, 100 cu yds of cement would be needed. Mud overboard loss would be small; mud loss downhole may be 20 cu yds; the rest would normally be reused in another well.

Drill cutting volume would average 300 cu yds per well. These would be dumped overboard through an underwater line.

Production of formation water would be small during the first years of production, probably less than 1 barrel water per 100 barrels oil. At the end of well life, produced water would have increased to approximately 8 barrels per barrel of oil. This water will typically be treated and reinjected into the formation at the edge of the remaining reservoir. An average production rate of 0.6 bbls of formation water per bbl of oil has been assumed.

Three production platforms are assumed in the 5 percent case, 2 gas and 1 oil; 2 platforms are assumed in the mean case, 1 oil and 1 gas; the 1 platform assumed in the 95 percent case produces oil and gas.

Shore facilities supporting development and production activity would be located near the producible field(s).

No petroleum refineries or petrochemical plants are expected to be constructed in Alaska as a result of this proposal. The construction of an LNG plant in Yakutat is assumed in the 5 percent case of the proposal and the mean case, if commercial, under assumptions described for the 5 percent case.

The above assumptions are used for the purpose of presenting reasonable exploration and development conditions. It is fully recognized that alternate assumptions are possible. Use of the stated assumptions is not intended as precluding others, and where appropriate, alternates are identified along with their implications for change.

Estimated Activity Based on the 95-percent (Minimum) Scenario: Exploration is expected to begin in 1981 and continue through 1985 with a total of 9 exploration and delineation wells drilled. No more than 2 rigs are assumed to be working during any year. Jack-up rigs could be used in shallow water and drillships and semi-submersibles could be used in areas with deeper water.

Primary support/supply activities would be based at the existing Yakutat facility owned by Atlantic Richfield Co. (ARCO) with some marine traffic utilizing the existing facilities at Seward. These facilities would be capable of handling all necessary marine support activities with no further expansion during the exploratory phase. Aircraft support would be conducted at the state-owned airport at Yakutat with Cape Yakataga being used as an auxilliary support area during bad weather.

If initiated, the development phase would begin in 1984 with the expansion of the support/supply base at Yakutat. An additional 10 hectares (25 acres) are anticipated for this expansion. In 1985, a single steel-jacketed, bottom-founded production platform would be installed with 39 production and service wells drilled between 1987 and 1990.

Pipeline construction would start in 1987 and continue through 1989. A total of 96 kms (60 mi) of 20 in oil pipeline would be constructed, of which 80 kms would be offshore.

An oil terminal would be constructed in 1985 adjacent to Monti Bay (Yakutat). A storage capacity of about 500,000 bbls of oil would be sufficient. Oil and gas production is estimated to begin in 1989 with oil production ceasing in 2008 and gas ceasing in 2025.

The assumed locations of all onshore facilities as well as offshore pipelines are the same as the mean case as illustrated in sec. I, fig. I.B.1.a.-1. A summary of activities required to develop the estimated minimum reserves are on table A-4.

Estimated Activity Based on the 5-percent (Maximum) Scenario: Exploration is expected to begin in 1981 and continue through 1986 with a total of 20 exploration and delineation wells drilled. No more than 4 rigs are assumed to be working during any year. Jack-up rigs could be used in shallow water and drillships and semi-submersibles could be used in deeper water.

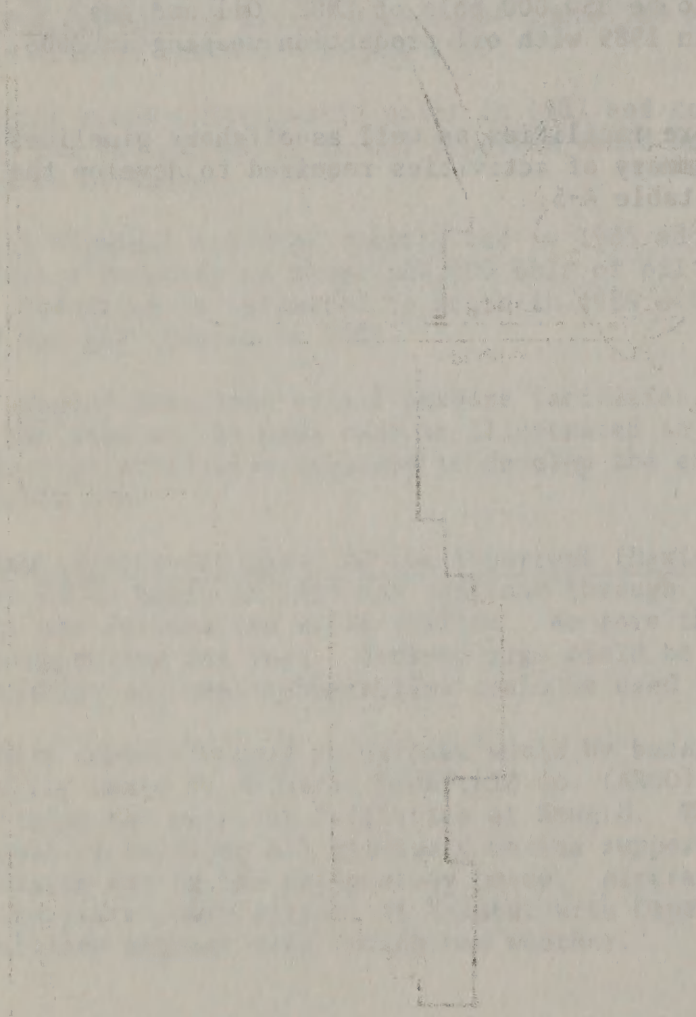
Primary support/supply activities would be based at the existing Yakutat facility owned by Atlantic Richfield Co. (ARCO), with some marine traffic utilizing the existing facilities at Seward. These 2 facilities would be capable of handling all necessary marine support activities with no further expansion during the exploratory phase. Aircraft support would be conducted at the state-owned airport at Yakutat with Cape Yakataga being used as an auxilliary support area during bad weather.

If initiated, the development phase would begin in 1984 with expansion of the support/supply base at Yakutat. An additional 10 hectares (25 acres) are anticipated for this expansion. In 1985, 2 steel-jacketed, bottom-founded production platforms would be installed with an additional 1 installed in 1986. A total of 128 production and service wells would be drilled between 1987 and 1992.

Pipeline construction would start in 1986 and would continue through 1987. A total of 96 kms (60 mi) of 20 in oil pipeline and 96 kms of 20 in gas pipeline would be constructed, of which 80 kms each for oil and gas would be offshore. All offshore pipe would be placed by a lay barge.

An oil terminal would be constructed in 1986 adjacent to Monti Bay (Yakutat). A storage capacity of about 1.4 million barrels of oil would be sufficient. The construction of an LNG (Liquefied Natural Gas) plant and terminal to be located adjacent to Monti Bay as appropriate and a regasification plant located in the lower 48 would begin in 1986 and continue through 1988. Storage capacity at the LNG terminal is estimated to be 850,000 bbls of LNG. Oil and gas production is estimated to begin in 1989 with oil production ceasing in 2008 and gas ceasing in 2022.

The assumed locations of all onshore facilities as well as offshore pipelines are illustrated in fig. A-1. A summary of activities required to develop the estimated maximum reserves are on table A-5.



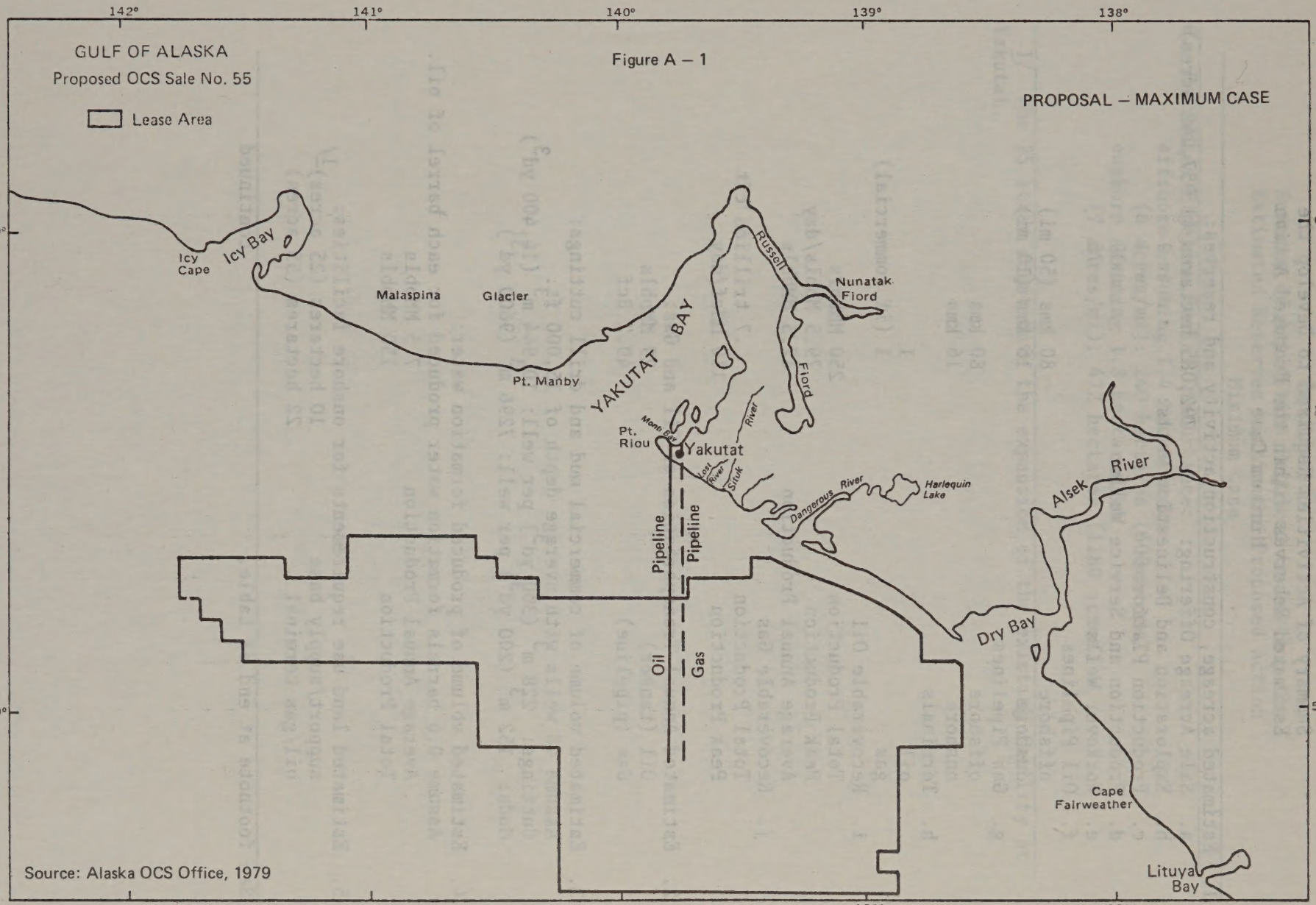

GULF OF ALASKA
Proposed OCS Sale No. 55
Lease Area
Figure A – 1
PROPOSAL – MAXIMUM CASE
142°
141°
140°
139°
138°
60°
59°
Icy Cape
Icy Bay
Malaspina Glacier
Pt. Manby
YAKUTAT BAY
Russell Fiord
Nunatak Fiord
Pt. Riou
Yakutat
Harlequin Lake
Dangerous River
Alsek River
Dry Bay
Pipeline
Pipeline
Oil
Gas
Cape Fairweather
Lituya Bay
Source: Alaska OCS Office, 1979

Table A-4
Summary of Activities Required to Develop the
Estimated Reserves within the Proposed Action
Minimum Case

1. Estimated acreage, construction activity and reserves:	
a. Sale Acreage Offering:	792,085 hectares (1,957,242 acres)
b. Exploration and Delineation Wells:	9
c. Production Platforms:	1
d. Production and Service Wells:	39
e. Workover Wells:	76
f. Oil Pipelines	
offshore	80 kms (50 mi)
onshore	16 kms (10 mi)
g. Gas Pipelines	
offshore	80 kms
onshore	16 kms
h. Terminals	
oil	1
gas	1 (if commercial)
i. Recoverable Oil	
Total Production	250 MMbbls
Peak Production	79.5 Mbbls/day
Average Annual Production	12.5 MMbbls
j. Recoverable Gas	
Total Production	.7 trillion cft
Peak Production	110 MMcf/day
2. Estimated Annual Transportation of Oil and Gas:	
Oil (tanker)	29 MMbbls
Gas (pipeline)	40.2 Bcf
3. Estimated volume of commercial mud and drill cuttings:	
Assume 48 wells with average depth of 15,000 ft.	
Cuttings: 228 m^3 (300 yd^3) per well:	10,944 m^3 (14,400 yd^3)
Muds: 152 m^3 (200 yd^3) per well:	7296 m^3 (9600 yd^3)
4. Estimated volume of produced formation water:	
Assume 0.6 barrels formation water produced for each barrel of oil.	
Average Annual Production	7.5 MMbbls
Total Production	150 MMbbls
5. Estimated land use requirements for onshore facilities:	
support/supply base	10 hectares (25 acres)[1/]
oil/gas terminal	22 hectares (55 acres)

See footnote at end of table.
continued

Table A-4
(continued)
Summary of Activities Required to Develop the Estimated Reserves within the Proposed Action Minimum Case

6. Estimated Pipeline Burial Disturbance:	
offshore assuming 1.4 hectares/km (6 acres/mi):	240 hectares (600 acres)
onshore assuming 1.8 hectares/km (7 acres/mi):	472 hectares (1180 acres)

1/ The 25 acres constitute the expansion of the existing facility at Yakutat.

Table A-5
Summary of Activities Required to Develop the
Estimated Reserves within the Proposed Action
Maximum Case

1.	Estimated acreage, construction activity and reserves:	
	a. Sale Acreage Offering:	792,085 hectares (1,957,242 acres)
	b. Exploration and Delineation Wells:	20
	c. Production Platforms:	3
	d. Production and Service Wells:	128
	e. Workover Wells:	301
	f. Oil Pipelines	
	offshore	80 kms (50 mi)
	onshore	16 kms (10 mi)
	g. Gas Pipelines	
	offshore	80 kms (50 mi)
	onshore	16 kms (10 mi)
	h. Terminals	
	oil	1
	gas	1
	i. Recoverable Oil	
	Total Production	800 MMbbls
	Peak Production	231.5 Mbbls/day
	Average Annual Production	40 MMbbls
	j. Recoverable Gas	
	Total Production	2250 Bcf
	Peak Production	374.2 MM cf/day
	Average Annual Production	66.2 Bcf
2.	Estimated Annual Transportation of Oil and Gas:	
	Oil (tanker)	84.5 MMbbls
	Gas (pipeline)	136.4 Bcf
3.	Estimated volume of commercial mud and drill cuttings:	
	Assume 148 wells with average depth of 15,000 ft.	
	Cuttings: 228 m^3 (300 yd^3) per well: 33744 m^3 (44,400 yd^3)	
	Muds: 152 m^3 (200 yd^3) per well: 22496 m^3 (29,600 yd^3)	
4.	Estimated volume of produced formation water:	
	Assume 0.6 barrels formation water produced for each barrel of oil.	
	Average Annual Production	24 MMbbls
	Total Production	480 MMbbls
5.	Estimated land use requirements for onshore facilities:	
	support/supply base	10 hectares (25 acres)[1/]
	oil terminal	56 hectares (140 acres)
	LNG plant	80 hectares (200 acres)

continued

Table A-5
(continued)
Summary of Activities Required to Develop the
Estimated Reserves within the Proposed Action
Maximum Case

6. Estimated Pipeline Burial Disturbance:
   offshore assuming 1.4 hectares/km
   (6 acres/mi): 240 hectares (600 acres)
   onshore assuming 1.8 hectares/km
   (7 acres/mi): 56 hectares (140 acres)

1/ The 25 acres constitute the expansion of the existing facility at Yakutat.

APPENDIX B

USGS ANALYSIS OF GULF OF ALASKA OCS OPERATING ORDERS

The enactment of the OCS Lands Act Amendments of 1978 has resulted in the review and revision of existing OCS oil and gas regulations. For this reason, revised area Orders have been issued for the Gulf of Alaska and other OCS areas. The Revised Area OCS Orders Nos. 1, 2, 3, 4, 5, 6, 7, 8, and 12 for the Gulf of Alaska, effective January 1, 1980, were published along with comments and discussion in Vol. 44, No. 247 of the Federal Register Notice on December 21, 1979. These revised OCS Orders governing oil and gas lease operations pursuant to Title 30 CFR Part 250.11 supercede previous OCS orders that had been in effect. The following analysis of these revised orders provides a brief summary of their content. The following is a discussion of those Orders.

Gulf of Alaska OCS Operating Order No. 1

This Order requires all platforms, drilling rigs, drilling ships, and wells to have signs of standard specifications for identification of the operator, the specific lease block of operation, and well number.

This Order also requires that all subsea objects resulting from lease operations which could present a hazard to other users of the OCS must be identified by navigational markings of a design approved by the Supervisor and not inconsistent with applicable U.S. Coast Guard Regulations. Under this provision, the potential for accidents associated with subsea production systems, "studs," fishing gear, and ship anchors is substantially reduced as is the possibility of an oilspill from such an accident.

The Order mitigates impacts caused by subsea completions on commercial fishing activities and anchoring, and mitigates impacts caused by the presence of platforms or drilling operations on shipping and navigation.

Gulf of Alaska OCS Operating Order No. 2

Order No. 2 concerns procedures for the drilling of wells. It requires the operators to file a drilling application which includes information on the drilling platform or vessel, well casing, mud control, safety training of the operator's personnel, and a list describing critical drilling operations which may be performed. The Order then describes certain procedures or equipment to be used in each phase of the drilling operation.

Due to the technical complexity of the Order, not all details are included in describing its mitigatory impact. This Order requires that drilling platforms and vessels must be capable of withstanding the oceanographic and meteorological conditions of the area; applications must include all pertinent data on the fitness of the platform or vessel, and each such drilling structure must be inspected by the GS for compliance with the OCS Orders. During the period of operations, operators

must collect and report oceanographic, meteorological, and performance data. These requirements should mitigate concerns about the impact of weather, waves, sediment scour, and currents on offshore drilling units.

Order No. 2 requires operators to conduct shallow geological hazards surveys of the well site or lease block prior to the commencement of drilling operations. The purpose of each survey is to locate shallow gas deposits, near-surface faults, obstructions, unstable bottom areas, or other conditions which are hazardous to drilling operations.

All wells must be cased and cemented to support unconsolidated sediments and to prevent leakage of fluids between formations or pressure changes in the well. If there are indications of improper cementing, the well must be recemented and logs run to insure proper sealing of the well. The casing design and setting depths are to be based on all engineering and geologic factors, including the presence or absence of hydrocarbons, potential geologic hazards, and water depths. Additional casing strings may be required if abnormal geopressures are encountered. A pressure test is required of all casing strings, except the drive or structural casing, to determine the presence of leaks or inadequate cementing. The use of casing described in this Order should eliminate potential impacts of freshwater zone contamination, lost production, or the possibility of accidents caused by improper protection.

Operators are required to obtain directional surveys on all wells. These surveys, which are filed with the Supervisor, insure that the well is drilled in accordance with approved specifications.

Blowout preventers and related pressure-control equipment must be installed, used, and tested in a manner necessary to insure positive well control. A specific number of these preventers must be used in every well, and they must be equipped with dual control systems and failsafe valving in critical lines and outlets. These devices provide protection against oilspills resulting from a loss of well control. Special requirements are included for floating drilling operations which necessitate the placement of the blowout preventer stack on the sea floor. These requirements are designed to mitigate the potential for accidents during deepwater drilling operations.

Order No. 2 specifies requirements for the use and testing of drilling muds. Drilling muds have a number of critical functions, one of the most important being the control of sub-surface pressures and the prevention of gaseous and liquid influxes into the wellbore. Drilling mud programs must be approved prior to the commencement of drilling. The operator must, at all times, maintain sufficient and readily accessible quantities of mud to insure well control.

Representatives of the operator must provide on-the-site supervision of drilling operations around the clock. A member of the drilling crew or

the toolpusher must maintain surveillance of the rig floor continuously from the time drilling operations commence until the well is either completed or abandoned. All supervisory personnel, including drillers, must be trained in present-day methods of well control, and records of the training are to be kept at the well site. Specific well-control training requirements are outlined in Geological Survey OCS Standard No. T 1 (GSS-OCS-T 1). The training requirements are intended to minimize the potential for well blowouts caused by human error. Formal training is supplemented with weekly blowout-prevention exercises for all rig personnel. These drills are performed during different drilling procedures to vary the experience of the crew. Drills are frequently witnessed by Geological Survey representatives and must always be recorded in the driller's log.

Procedures to be followed when drilling operations may penetrate reservoirs known or expected to contain hydrogen sulfide gas (H_2S) are included in U.S. Geological Survey OCS Standard No. 1 (GSS-OCS-1), "Safety Requirements for Drilling Operations in a Hydrogen Sulfide Environment." This set of standard operating procedures will assure proper equipment testing and crew training should highly toxic H_2S be encounterd. Hazards of H_2S are substantially reduced by the institution of these procedures.

Since some operations performed in drilling are considered more critical than others with respect to well-control problems, fires, explosions, oilspills, and other accidents, each operator must file a Critical Operations and Curtailment Plan for the Supervisor's approval.

This Order includes a list and description of critical operation categories. Before exceeding the operational limits of an approved plan, the operator must notify the Supervisor and curtail operations. This allows the Geological Survey to provide either specific approval in advance of the conduct of the critical operation or to dispatch personnel to the lease site for observation of the operation. This part of proposed OCS Order No. 2 will provide additional regulatory review of drilling operations which may be hazardous to the drilling platform, vessel, crew, and the environment.

Gulf of Alaska OCS Operating Order No. 3

This Order is established to provide control of the plugging and abandonment of wells which have been drilled for oil and gas. For permanent abandonment of wells, cement plugs must be placed so as to extend 30 meters (100 feet) above the top and 30 meters below the bottom of freshwater and oil and gas zones to prevent those fluids from escaping into other strata. Portions of a well in which abnormal pressures are encountered are also required to be isolated with cement plugs. Plugs are required at the bottom of the deepest casing where an uncased hold exists below. Plugs or cement retainers are required to be placed 30 meters above the top and 30 meters below any perforated interval of the

well hole used for production of oil and gas. A "surface" plug 45 meters (150 feet) long must be placed 45 meters or less below the ocean floor. A pressure test must be made on top of the first plug below the surface plug. The spacing between plugs must be filled with drilling muds of sufficient density to exceed the greatest formation pressure encountered in drilling the interval.

The casing and piling on the sea floor must be removed to a depth below the ocean floor approved by the Supervisor. For temporary abandonments, all plugs and mud discussed above must be placed in the well with the exception of the surface plug. (The temporary abandoned well would have to be marked in accordance with proposed Order No. 1.)

This Order should eliminate concern about contamination of freshwater zones or the possibility of oil and gas leaks from abandoned wells. The requirements that the sea floor above each final abandonment must be cleared, and that the removal depth of casing and piling must be examined on a case-by-case basis, will provide protection to navigation and fishery interest. The chance that obstructions might become exposed due to changes in bottom conditions is reduced as well.

Gulf of Alaska OCS Operating Order No. 4

Order No. 4 provides for the extension of a lease beyond its primary term for as long as oil or gas may be produced in paying quantities and the operator has met the requirements for diligent development. If these circumstances should occur, a lease can be extended beyond its initial term pursuant to Section 8(b)(2) of the OCS Lands Acts and Title 30 CFR 250.11 and 250.12(d)(1).

In addition to a production test for oil, one of similar duration is required for gas. All pertinent engineering, geologic, and economic data are required to support a claim that a well is capable of being produced in commercial quantities. Each test must be witnessed by the Geological Survey although, with prior approval, an operator affidavit and third-party test results may be acceptable. The primary purpose of this Order is to provide for determinations of well productivity which may permit extensions of lease terms. Such extensions are frequently necessary to insure the orderly development of OCS oil and gas resources.

Gulf of Alaska OCS Operating Order No. 5

This Order sets forth requirements for the Best Available and Safest Technology (BAST) of the installation, design, testing, operation, and removal of subsurface safety devices.

Order No. 5 requires that all well tubing installations open to hydrocarbon-bearing zones shall be equipped with a surface-controlled, subsurface-safety device that is placed 30 meters or more below the ocean floor.

All wells perforated and completed, but not placed on production, must be equipped with a subsurface-safety device or tubing plug within 2 days after the well is completed. Subsurface-safety devices shall also be placed in injection wells unless they are capable of flowing. All safety devices must comply with the minimum standards set forth in the API Spec. 14A, Second Edition, November 1977, "Specification for Subsurface Safety Valves," and recent supplements as approved by the Area Supervisor. Testing of the device must take place monthly for 6 months after installation, and quarterly thereafter; if it does not operate correctly, it must be promptly removed and a properly operating device must be put in place and tested. Additional protective equipment is also required with the use of subsurface protective devices. When tubing is open to hydrocarbon zones and is not equipped with a subsurface safety device (during workover), the well must be marked, and a safety device or tubing plug must be available at the field location to be installed if necessary. Records must be kept of all subsurface-safety devices employed at each well with quarterly reports prepared on reasons for any failures of the devices.

The subsurface-safety valves prescribed in this Order serve as a mechanism for automatically shutting in a well below the ocean floor in the event of an accident or natural event which destroys or threatens to destroy surface well-control equipment. The reliability of such devices is maximized through regular testing. As a result of these requirements, the probability of a producible well blowout is extremely small.

Order No. 5 also sets forth requirements for the design, installation, operation, and testing of safety systems for platform production facilities. All new platforms resulting from this sale will have to be in conformance with API RP 14C, "Analysis, Design, Installation, and Testing of Basic Surface Systems on Offshore Production Platforms."

Prior to the installation of platform equipment, operators must submit, for the Supervisor's approval, schematic diagrams with equipment, piping, firefighting, electrical-system, gas-detection, and safety-shutdown specifications. A Safety Analysis Function Evaluation Chart must also be submitted. This chart relates all sensing devices, shutdown devices, and emergency-support systems to their functions. The chart provides a means of verifying the design logic of the basic safety system. A Safety Analysis checklist is also prepared. This checklist permits an analysis of the system's redundancy and the numbers and types of system failures that would have to occur before an undesirable event would result. The safety analysis procedures prescribed in this Order identify events that might pose a threat to safety or the environment and define reliable protective measures that will prevent such events or minimize their effects should they occur.

All platforms must have curbs, gutters, and drains in all deck areas to collect contaminants in a pump system. This requirement prevents the discharge of such contaminants into the sea.

Whenever operators plan to conduct activities, simultaneously with production operations, which could increase the possibility of accidents, a contingency plan must be filed for the Supervisor's approval. Activities requiring the plan include drilling, workover, wireline, pumpdown, and major construction operations. The intent of this requirement is to permit Geological Survey review of the conduct, control, and coordinations of the proposed operations. This review will determine whether the operations can be conducted simultaneously without significantly increasing the risk of accidents or spills.

Prior to welding or burning operations, operators must submit a plan describing personnel requirements and designating safe welding areas. Procedures for establishing safe welding areas and for conducting operations outside such areas are specified in the Order. The requirements reduce the potential for explosions, injuries, and pollution discharges.

To mitigate the potential for accidents resulting from human error, all personnel engaged in installing, inspecting, testing, and maintaining safety devices must meet specific training requirements. The Order also sets forth requirements for employee orientation and motivation programs concerned with safety and pollution prevention in offshore oil and gas operations.

Gulf of Alaska OCS Operating Order No. 7

Order No. 7 concerns the prevention of pollution to the marine environment and provides rules for the disposal of waste materials generated as a result of offshore operations.

OCS Order No. 7 sets forth a means to effectively deal with pollution of the marine environment from offshore petroleum operations. It states that the operator must prevent pollution of the ocean and that the disposal of waste products must not create conditions that can "adversely affect the public health, life or property, aquatic life or wildlife, recreation, navigation, or other uses of the ocean."

The operator must submit a list of drilling mud constituents, additives, and concentrations expected to be used; this provides a means to prohibit or alter the disposal and use of specific components which might be harmful to the environment. Muds containing free oil shall not be disposed of into the ocean. The disposal of oil-free muds into the sea must be by approved methods. These requirements greatly reduce the potential impacts on biological communities, water quality, commercial fisheries, and offshore recreation and also mitigate impacts along the coastline which would be caused by the washing of oil, fuel, chemical residues, or toxic substances to shore.

No drill cuttings, sand, or other solids containing free oil are to be disposed of into the ocean unless the oil is removed thus minimizing their potential impacts to water quality and marine organisms. No solid waste materials or debris can be disposed of in the marine environment. The disposal of equipment into the sea is prohibited except under emergency conditions. The location and description of any equipment so discharged must be reported to the Supervisor. This requirement is intended to mitigate the potential for interference with commercial fishing operations.

All personnel must be thoroughly instructed in the prevention of pollution from offshore operations. Rigorous inspection schedules are required for all facilities. Pollution reports are required for all oilspills, and procedures are set forth for the notification of proper authorities. Pollution-control equipment must be maintained or available to each operator. The equipment must include booms, skimmers, cleanup materials, and chemical agents. (Chemical agents may only be used with the consent of the Supervisor in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan.) The equipment must be maintained and inspected monthly.

Operators must submit an oilspill contingency plan for approval by the Supervisor before an application to conduct drilling operations may be approved. The plan must contain provisions for varying degrees of response effort depending on the severity of the oilspill; identification of containment and cleanup equipment availability; notification of responsible persons and alternates in the event of a spill; identification of areas of special biological sensitivity; and specific actions to be taken after the discovery of an oil discharge. Should a spill occur, immediate corrective action must be taken.

Drills and training classes for familiarization with pollution-control equipment and operational procedures must be conducted on a schedule approved by the Supervisor. The drills must include the deployment of equipment. Although the emphasis of the OCS Orders is on the prevention of oilspills, it is recognized that spills will occur. It is also recognized that it is not technically possible to completely control and mechanically remove all oil that is discharged. The intent of this portion of the Order is to insure that operators have ready access to the best practical control equipment for the area and that personnel are trained to effectively utilize the equipment. The operator's plans must have sufficient flexibility to permit different spill-control strategies for different environmental conditions. This provides for mechanical and chemical measures which best compliment the forces of nature and maximize the protection of biological communities, shoreline resources, and commercial interests.

Gulf of Alaska OCS Operating Order No. 8

The Order sets forth requirements for the design, installation, and protection of platforms and structures. Designs must be in accordance with API Recommended Practice (RP) 2A, "Planning, Designing, and Constructing Fixed Offshore Structure." Sufficient environmental data must be gathered to permit a determination of design wave, wind, current, tide, temperatures, seismic, and geotechnical conditions. This environmental data must be factored into the design on the basis of the Order's specifications. Structural modifications must be approved by the Supervisor. All structural plans must be certified by a registered professional structural engineer or civil engineer specializing in structural design. This Order assures careful review of platform design and minimizes the probability of spills and environmental damage resulting from structural failure.

Gulf of Alaska OCS Operating Order No. 12

This Order sets forth requirements for the public availability of data and records concerning offshore petroleum operations. Under the Order, specific types of data and records pertaining to drilling and production operations, well tests, sales of lease production, accidents, inspections, and pollution incidents are to be available for public inspection. Privileged information such as certain geological and geophysical data would be made available for public inspection with the lessee's consent or after a fixed period of time has elapsed. By making operations data available, this Order permits increased public awareness of OCS activities and involvement in OCS programs. Increased public interest and understanding should result in continuing improvements in the safety and pollution-prevention programs of both industry and Government.

APPENDIX C

TRACT LIST

EASTERN GULF OF ALASKA

SALE 55

Proposal (95 Percent, Mean, and 5 Percent Cases)
350 Blocks

	Block No.	Lease Map No.	Hectares	Acres	Miles From Shore	Depth In Meters
Icy Bay						
55-1	704	NO 7-1	2304.00	5,693.18	25	200
55-2	740	NO 7-1	2304.00	5,693.18	39	200
55-3	741	NO 7-1	2304.00	5,693.18	39	240
55-4	742	NO 7-1	2304.00	5,693.18	37	260
55-5	743	NO 7-1	2304.00	5,693.18	36	315
55-6	744	NO 7-1	2304.00	5,693.18	35	350
55-7	748	NO 7-1	2304.00	5,693.18	31	170
55-8	784	NO 7-1	2304.00	5,693.18	44	250
55-9	785	NO 7-1	2304.00	5,693.18	42	250
55-10	786	NO 7-1	2304.00	5,693.18	41	290
55-11	787	NO 7-1	2304.00	5,693.18	39	310
55-12	788	NO 7-1	2304.00	5,693.18	38	340
55-13	789	NO 7-1	2304.00	5,693.18	36	320
55-14	790	NO 7-1	2304.00	5,693.18	35	300
55-15	791	NO 7-1	2304.00	5,693.18	35	210
55-16	792	NO 7-1	2304.00	5,693.18	34	185
55-17	829	NO 7-1	2304.00	5,693.18	45	275
55-18	830	NO 7-1	2304.00	5,693.18	43	290
55-19	831	NO 7-1	2304.00	5,693.18	42	310
55-20	832	NO 7-1	2304.00	5,693.18	40	340
55-21	833	NO 7-1	2304.00	5,693.18	39	330
55-22	834	NO 7-1	2304.00	5,693.18	38	300
55-23	835	NO 7-1	2304.00	5,693.18	38	225
55-24	836	NO 7-1	2304.00	5,693.18	37	195
55-25	874	NO 7-1	2304.00	5,693.18	46	300
55-26	875	NO 7-1	2304.00	5,693.18	45	315
55-27	876	NO 7-1	2304.00	5,693.18	43	340
55-28	877	NO 7-1	2304.00	5,693.18	42	340
55-29	878	NO 7-1	2304.00	5,693.18	41	300
55-30	879	NO 7-1	2304.00	5,693.18	40	225
55-31	880	NO 7-1	2304.00	5,693.18	40	190
55-32	919	NO 7-1	2304.00	5,693.18	47	375
55-33	920	NO 7-1	2304.00	5,693.18	46	375
55-34	921	NO 7-1	2304.00	5,693.18	45	320
55-35	922	NO 7-1	2304.00	5,693.18	44	275
55-36	923	NO 7-1	2304.00	5,693.18	43	200
55-37	924	NO 7-1	2304.00	5,693.18	43	190
Yakutat						
55-38	661	NO 7-2	2304.00	5,693.18	27	170
55-39	662	NO 7-2	2304.00	5,693.18	26	160
55-40	663	NO 7-2	2304.00	5,693.18	26	155

	Block No.	Lease Map No.	Hectares	Acres	Miles From Shore	Depth In Meters
55-41	664	NO 7-2	2304.00	5,693.18	25	150
55-42	665	NO 7-2	2304.00	5,693.18	25	145
55-43	705	NO 7-2	2304.00	5,693.18	30	170
55-44	706	NO 7-2	2304.00	5,693.18	29	160
55-45	707	NO 7-2	2304.00	5,693.18	29	150
55-46	708	NO 7-2	2304.00	5,693.18	28	145
55-47	709	NO 7-2	2304.00	5,693.18	28	140
55-48	710	NO 7-2	2304.00	5,693.18	28	135
55-49	723	NO 7-2	2304.00	5,693.18	6	65
55-50	724	NO 7-2	1613.00	3,985.75	5	50
55-51	725	NO 7-2	622.00	1,536.96	4	45
55-52	726	NO 7-2	12.00	29.65	4	30
55-53	749	NO 7-2	2304.00	5,693.18	33	175
55-54	750	NO 7-2	2304.00	5,693.18	32	165
55-55	751	NO 7-2	2304.00	5,693.18	32	155
55-56	752	NO 7-2	2304.00	5,693.18	31	145
55-57	753	NO 7-2	2304.00	5,693.18	31	145
55-58	754	NO 7-2	2304.00	5,693.18	31	135
55-59	755	NO 7-2	2304.00	5,693.18	31	135
55-60	756	NO 7-2	2304.00	5,693.18	27	130
55-61	764	NO 7-2	2304.00	5,693.18	14	150
55-62	765	NO 7-2	2304.00	5,693.18	12	145
55-63	766	NO 7-2	2304.00	5,693.18	10	130
55-64	767	NO 7-2	2304.00	5,693.18	8	105
55-65	768	NO 7-2	2304.00	5,693.18	7	75
55-66	769	NO 7-2	2304.00	5,693.18	6	60
55-67	770	NO 7-2	1993.00	4,924.70	5	40
55-68	771	NO 7-2	945.00	2,335.09	4	30
55-69	772	NO 7-2	92.00	227.33	4	30
55-70	793	NO 7-2	2304.00	5,693.18	36	185
55-71	794	NO 7-2	2304.00	5,693.18	35	170
55-72	795	NO 7-2	2304.00	5,693.18	35	160
55-73	796	NO 7-2	2304.00	5,693.18	35	145
55-74	797	NO 7-2	2304.00	5,693.18	34	145
55-75	798	NO 7-2	2304.00	5,693.18	33	140
55-76	799	NO 7-2	2304.00	5,693.18	31	135
55-77	800	NO 7-2	2304.00	5,693.18	29	130
55-78	801	NO 7-2	2304.00	5,693.18	27	125
55-79	802	NO 7-2	2304.00	5,693.18	26	125
55-80	803	NO 7-2	2304.00	5,693.18	24	120
55-81	804	NO 7-2	2304.00	5,693.18	22	120
55-82	805	NO 7-2	2304.00	5,693.18	21	125
55-83	806	NO 7-2	2304.00	5,693.18	19	130
55-84	807	NO 7-2	2304.00	5,693.18	17	140
55-85	808	NO 7-2	2304.00	5,693.18	16	140
55-86	809	NO 7-2	2304.00	5,693.18	14	140
55-87	810	NO 7-2	2304.00	5,693.18	13	135
55-88	811	NO 7-2	2304.00	5,693.18	11	95
55-89	812	NO 7-2	2304.00	5,693.18	10	100
55-90	813	NO 7-2	2304.00	5,693.18	8	75

	Block No.	Lease Map No.	Hectares	Acres	Miles From Shore	Depth In Meters
55-91	814	NO 7-2	2304.00	5,693.18	17	65
55-92	815	NO 7-2	2304.00	5,693.18	16	50
55-93	816	NO 7-2	2120.00	5,238.52	5	40
55-94	817	NO 7-2	991.00	2,448.76	4	35
55-95	818	NO 7-2	23.00	56.83	4	35
55-96	837	NO 7-2	2304.00	5,693.18	40	185
55-97	838	NO 7-2	2304.00	5,693.18	39	175
55-98	839	NO 7-2	2304.00	5,693.18	38	162
55-99	840	NO 7-2	2304.00	5,693.18	38	150
55-100	841	NO 7-2	2304.00	5,693.18	38	145
55-101	842	NO 7-2	2304.00	5,693.18	35	140
55-102	843	NO 7-2	2304.00	5,693.18	34	137
55-103	844	NO 7-2	2304.00	5,693.18	32	130
55-104	845	NO 7-2	2304.00	5,693.18	30	126
55-105	846	NO 7-2	2304.00	5,693.18	29	120
55-106	847	NO 7-2	2304.00	5,693.18	27	120
55-107	848	NO 7-2	2304.00	5,693.18	25	120
55-108	849	NO 7-2	2304.00	5,693.18	23	120
55-109	850	NO 7-2	2304.00	5,693.18	21	120
55-110	851	NO 7-2	2304.00	5,693.18	20	130
55-111	852	NO 7-2	2304.00	5,693.18	18	130
55-112	853	NO 7-2	2304.00	5,693.18	17	125
55-113	854	NO 7-2	2304.00	5,693.18	15	120
55-114	855	NO 7-2	2304.00	5,693.18	13	115
55-115	856	NO 7-2	2304.00	5,693.18	12	100
55-116	857	NO 7-2	2304.00	5,693.18	11	85
55-117	858	NO 7-2	2304.00	5,693.18	10	85
55-118	859	NO 7-2	2304.00	5,693.18	9	60
55-119	860	NO 7-2	2304.00	5,693.18	8	60
55-120	861	NO 7-2	2304.00	5,693.18	6	50
55-121	862	NO 7-2	553.00	1,366.46	5	40
55-122	881	NO 7-2	2304.00	5,693.18	42	195
55-123	882	NO 7-2	2304.00	5,693.18	42	175
55-124	883	NO 7-2	2304.00	5,693.18	41	165
55-125	884	NO 7-2	2304.00	5,693.18	41	155
55-126	885	NO 7-2	2304.00	5,693.18	40	145
55-127	886	NO 7-2	2304.00	5,693.18	38	140
55-128	887	NO 7-2	2304.00	5,693.18	36	140
55-129	888	NO 7-2	2304.00	5,693.18	34	137
55-130	889	NO 7-2	2304.00	5,693.18	33	130
55-131	890	NO 7-2	2304.00	5,693.18	31	125
55-132	891	NO 7-2	2304.00	5,693.18	29	120
55-133	892	NO 7-2	2304.00	5,693.18	28	120
55-134	893	NO 7-2	2304.00	5,693.18	26	120
55-135	894	NO 7-2	2304.00	5,693.18	24	120
55-136	895	NO 7-2	2304.00	5,693.18	22	120
55-137	896	NO 7-2	2304.00	5,693.18	21	120
55-138	897	NO 7-2	2304.00	5,693.18	19	120
55-139	898	NO 7-2	2304.00	5,693.18	18	120
55-140	899	NO 7-2	2304.00	5,693.18	17	115

	Block No.	Lease Map No.	Hectares	Acres	Miles From Shore	Depth In Meters
55-141	900	NO 7-2	2304.00	5,693.18	15	100
55-142	901	NO 7-2	2304.00	5,693.18	14	90
55-143	902	NO 7-2	2304.00	5,693.18	13	85
55-144	903	NO 7-2	2304.00	5,693.18	11	75
55-145	904	NO 7-2	2304.00	5,693.18	10	70
55-146	905	NO 7-2	2304.00	5,693.18	8	65
55-147	906	NO 7-2	2304.00	5,693.18	6	65
55-148	930	NO 7-2	2304.00	5,693.18	40	145
55-149	931	NO 7-2	2304.00	5,693.18	38	140
55-150	932	NO 7-2	2304.00	5,693.18	37	140
55-151	933	NO 7-2	2304.00	5,693.18	35	135
55-152	934	NO 7-2	2304.00	5,693.18	33	130
55-153	935	NO 7-2	2304.00	5,693.18	32	130
55-154	936	NO 7-2	2304.00	5,693.18	30	130
55-155	937	NO 7-2	2304.00	5,693.18	28	130
55-156	938	NO 7-2	2304.00	5,693.18	27	125
55-157	939	NO 7-2	2304.00	5,693.18	25	120
55-158	940	NO 7-2	2304.00	5,693.18	22	125
55-159	941	NO 7-2	2304.00	5,693.18	22	130
55-160	942	NO 7-2	2304.00	5,693.18	20	120
55-161	943	NO 7-2	2304.00	5,693.18	20	115
55-162	944	NO 7-2	2304.00	5,693.18	19	110
55-163	945	NO 7-2	2304.00	5,693.18	17	100
55-164	946	NO 7-2	2304.00	5,693.18	16	90
55-165	947	NO 7-2	2304.00	5,693.18	14	85
55-166	948	NO 7-2	2304.00	5,693.18	13	80
55-167	949	NO 7-2	2304.00	5,693.18	11	85
55-168	950	NO 7-2	2304.00	5,693.18	9	90
55-169	951	NO 7-2	2304.00	5,693.18	7	110
55-170	952	NO 7-2	2304.00	5,693.18	5	120
55-171	974	NO 7-2	2304.00	5,693.18	42	155
55-172	975	NO 7-2	2304.00	5,693.18	41	145
55-173	976	NO 7-2	2304.00	5,693.18	40	140
55-174	977	NO 7-2	2304.00	5,693.18	38	137
55-175	978	NO 7-2	2304.00	5,693.18	36	140
55-176	979	NO 7-2	2304.00	5,693.18	35	135
55-177	980	NO 7-2	2304.00	5,693.18	33	135
55-178	981	NO 7-2	2304.00	5,693.18	31	135
55-179	982	NO 7-2	2304.00	5,693.18	29	130
55-180	983	NO 7-2	2304.00	5,693.18	28	125
55-181	984	NO 7-2	2304.00	5,693.18	26	125
55-182	985	NO 7-2	2304.00	5,693.18	25	125
55-183	986	NO 7-2	2304.00	5,693.18	23	120
55-184	987	NO 7-2	2304.00	5,693.18	22	115
55-185	988	NO 7-2	2304.00	5,693.18	21	110
55-186	989	NO 7-2	2304.00	5,693.18	20	105
55-187	990	NO 7-2	2304.00	5,693.18	18	100
55-188	991	NO 7-2	2304.00	5,693.18	17	90
55-189	992	NO 7-2	2304.00	5,693.18	16	90
55-190	993	NO 7-2	2304.00	5,693.18	13	100

	Block No.	Lease Map No.	Hectares	Acres	Miles From Shore	Depth In Meters
55-191	994	NO 7-2	2304.00	5,693.18	11	115
55-192	995	NO 7-2	2304.00	5,693.18	9	140
55-193	996	NO 7-2	2304.00	5,693.18	7	150
55-194	1018	NO 7-2	2304.00	5,693.18	45	170
55-195	1019	NO 7-2	2304.00	5,693.18	44	165
55-196	1020	NO 7-2	2304.00	5,693.18	42	160
55-197	1021	NO 7-2	2304.00	5,693.18	40	150
55-198	1022	NO 7-2	2304.00	5,693.18	38	145
55-199	1023	NO 7-2	2304.00	5,693.18	37	145
55-200	1024	NO 7-2	2304.00	5,693.18	35	140
55-201	1025	NO 7-2	2304.00	5,693.18	33	140
55-202	1026	NO 7-2	2304.00	5,693.18	32	135
55-203	1027	NO 7-2	2304.00	5,693.18	30	135
55-204	1028	NO 7-2	2304.00	5,693.18	29	130
55-205	1029	NO 7-2	2304.00	5,693.18	27	125
55-206	1030	NO 7-2	2304.00	5,693.18	26	120
55-207	1031	NO 7-2	2304.00	5,693.18	25	115
55-208	1032	NO 7-2	2304.00	5,693.18	24	115
55-209	1033	NO 7-2	2304.00	5,693.18	22	110
55-210	1034	NO 7-2	2304.00	5,693.18	21	110
55-211	1035	NO 7-2	2304.00	5,693.18	20	105
55-212	1036	NO 7-2	2304.00	5,693.18	18	110
55-213	1037	NO 7-2	2304.00	5,693.18	15	125
55-214	1038	NO 7-2	2304.00	5,693.18	13	155
55-215	1039	NO 7-2	2304.00	5,693.18	12	170
55-216	1040	NO 7-2	2304.00	5,693.18	11	170
Alsek Valley						
55-217	6	NO 7-4	2304.00	5,693.18	47	180
55-218	7	NO 7-4	2304.00	5,693.18	45	175
55-219	8	NO 7-4	2304.00	5,693.18	44	170
55-220	9	NO 7-4	2304.00	5,693.18	42	165
55-221	10	NO 7-4	2304.00	5,693.18	40	160
55-222	11	NO 7-4	2304.00	5,693.18	38	160
55-223	12	NO 7-4	2304.00	5,693.18	37	155
55-224	13	NO 7-4	2304.00	5,693.18	35	145
55-225	14	NO 7-4	2304.00	5,693.18	33	140
55-226	15	NO 7-4	2304.00	5,693.18	32	140
55-227	16	NO 7-4	2304.00	5,693.18	31	135
55-228	17	NO 7-4	2304.00	5,693.18	30	130
55-229	18	NO 7-4	2304.00	5,693.18	28	125
55-230	19	NO 7-4	2304.00	5,693.18	27	120
55-231	20	NO 7-4	2304.00	5,693.18	26	120
55-232	21	NO 7-4	2304.00	5,693.18	25	115
55-233	22	NO 7-4	2304.00	5,693.18	23	110
55-234	23	NO 7-4	2304.00	5,693.18	21	110
55-235	24	NO 7-4	2304.00	5,693.18	19	120
55-236	25	NO 7-4	2304.00	5,693.18	18	150
55-237	26	NO 7-4	2304.00	5,693.18	16	200

	Block No.	Lease Map No.	Hectares	Acres	Miles From Shore	Depth In Meters
55-238	27	NO 7-4	2304.00	5,693.18	14	185
55-239	28	NO 7-4	2304.00	5,693.18	13	160
55-240	54	NO 7-4	2304.00	5,693.18	43	165
55-241	55	NO 7-4	2304.00	5,693.18	41	162
55-242	56	NO 7-4	2304.00	5,693.18	39	160
55-243	57	NO 7-4	2304.00	5,693.18	38	155
55-244	58	NO 7-4	2304.00	5,693.18	36	152
55-245	59	NO 7-4	2304.00	5,693.18	35	150
55-246	60	NO 7-4	2304.00	5,693.18	34	140
55-247	61	NO 7-4	2304.00	5,693.18	32	135
55-248	62	NO 7-4	2304.00	5,693.18	31	130
55-249	63	NO 7-4	2304.00	5,693.18	30	120
55-250	64	NO 7-4	2304.00	5,693.18	29	120
55-251	65	NO 7-4	2304.00	5,693.18	28	120
55-252	66	NO 7-4	2304.00	5,693.18	26	120
55-253	67	NO 7-4	2304.00	5,693.18	24	120
55-254	68	NO 7-4	2304.00	5,693.18	22	135
55-255	69	NO 7-4	2304.00	5,693.18	20	185
55-256	98	NO 7-4	2304.00	5,693.18	45	180
55-257	99	NO 7-4	2304.00	5,693.18	43	170
55-258	100	NO 7-4	2304.00	5,693.18	42	170
55-259	101	NO 7-4	2304.00	5,693.18	40	165
55-260	102	NO 7-4	2304.00	5,693.18	39	160
55-261	103	NO 7-4	2304.00	5,693.18	38	155
55-262	104	NO 7-4	2304.00	5,693.18	36	155
55-263	105	NO 7-4	2304.00	5,693.18	35	150
55-264	106	NO 7-4	2304.00	5,693.18	34	140
55-265	107	NO 7-4	2304.00	5,693.18	33	135
55-266	108	NO 7-4	2304.00	5,693.18	32	130
55-267	109	NO 7-4	2304.00	5,693.18	30	120
55-268	110	NO 7-4	2304.00	5,693.18	28	120
55-269	111	NO 7-4	2304.00	5,693.18	26	125
55-270	112	NO 7-4	2304.00	5,693.18	24	175
55-271	113	NO 7-4	2304.00	5,693.18	22	210
55-272	142	NO 7-4	2304.00	5,693.18	48	185
55-273	143	NO 7-4	2304.00	5,693.18	46	180
55-274	144	NO 7-4	2304.00	5,693.18	45	177
55-275	145	NO 7-4	2304.00	5,693.18	43	175
55-276	146	NO 7-4	2304.00	5,693.18	42	170
55-277	147	NO 7-4	2304.00	5,693.18	40	165
55-278	148	NO 7-4	2304.00	5,693.18	39	160
55-279	149	NO 7-4	2304.00	5,693.18	38	155
55-280	150	NO 7-4	2304.00	5,693.18	37	150
55-281	151	NO 7-4	2304.00	5,693.18	36	140
55-282	152	NO 7-4	2304.00	5,693.18	34	140
55-283	153	NO 7-4	2304.00	5,693.18	32	135
55-284	154	NO 7-4	2304.00	5,693.18	30	135
55-285	155	NO 7-4	2304.00	5,693.18	28	175
55-286	156	NO 7-4	2304.00	5,693.18	27	205
55-287	157	NO 7-4	2304.00	5,693.18	25	220

	Block No.	Lease Map No.	Hectares	Acres	Miles From Shore	Depth In Meters
55-288	186	NO 7-4	2304.00	5,693.18	50	190
55-289	187	NO 7-4	2304.00	5,693.18	49	185
55-290	188	NO 7-4	2304.00	5,693.18	47	185
55-291	189	NO 7-4	2304.00	5,693.18	46	180
55-292	190	NO 7-4	2304.00	5,693.18	44	175
55-293	191	NO 7-4	2304.00	5,693.18	43	170
55-294	192	NO 7-4	2304.00	5,693.18	42	170
55-295	193	NO 7-4	2304.00	5,693.18	41	170
55-296	194	NO 7-4	2304.00	5,693.18	39	165
55-297	195	NO 7-4	2304.00	5,693.18	38	155
55-298	196	NO 7-4	2304.00	5,693.18	37	155
55-299	197	NO 7-4	2304.00	5,693.18	34	175
55-300	198	NO 7-4	2304.00	5,693.18	32	200
55-301	199	NO 7-4	2304.00	5,693.18	31	210
55-302	200	NO 7-4	2304.00	5,693.18	29	220
55-303	201	NO 7-4	2304.00	5,693.18	28	220
55-304	230	NO 7-4	2304.00	5,693.18	53	190
55-305	231	NO 7-4	2304.00	5,693.18	51	185
55-306	232	NO 7-4	2304.00	5,693.18	50	185
55-307	233	NO 7-4	2304.00	5,693.18	48	180
55-308	234	NO 7-4	2304.00	5,693.18	47	180
55-309	235	NO 7-4	2304.00	5,693.18	46	180
55-310	236	NO 7-4	2304.00	5,693.18	45	177
55-311	237	NO 7-4	2304.00	5,693.18	44	177
55-312	238	NO 7-4	2304.00	5,693.18	42	175
55-313	239	NO 7-4	2304.00	5,693.18	41	180
55-314	240	NO 7-4	2304.00	5,693.18	39	190
55-315	241	NO 7-4	2304.00	5,693.18	37	210
55-316	242	NO 7-4	2304.00	5,693.18	35	220
55-317	243	NO 7-4	2304.00	5,693.18	33	220
55-318	244	NO 7-4	2304.00	5,693.18	32	220
55-319	245	NO 7-4	2304.00	5,693.18	31	210
55-320	274	NO 7-4	2304.00	5,693.18	55	200
55-321	275	NO 7-4	2304.00	5,693.18	54	195
55-322	276	NO 7-4	2304.00	5,693.18	52	190
55-323	277	NO 7-4	2304.00	5,693.18	51	185
55-324	278	NO 7-4	2304.00	5,693.18	50	185
55-325	279	NO 7-4	2304.00	5,693.18	49	185
55-326	280	NO 7-4	2304.00	5,693.18	47	185
55-327	281	NO 7-4	2304.00	5,693.18	46	185
55-328	282	NO 7-4	2304.00	5,693.18	45	190
55-329	283	NO 7-4	2304.00	5,693.18	43	210
55-330	284	NO 7-4	2304.00	5,693.18	41	210
55-331	285	NO 7-4	2304.00	5,693.18	39	220
55-332	286	NO 7-4	2304.00	5,693.18	37	240
55-333	287	NO 7-4	2304.00	5,693.18	36	220
55-334	288	NO 7-4	2304.00	5,693.18	35	180
55-335	318	NO 7-4	2304.00	5,693.18	58	400
55-336	319	NO 7-4	2304.00	5,693.18	56	250
55-337	320	NO 7-4	2304.00	5,693.18	55	195

	Block No.	Lease Map No.	Hectares	Acres	Miles From Shore	Depth In Meters
55-338	321	NO 7-4	2304.00	5,693.18	54	190
55-339	322	NO 7-4	2304.00	5,693.18	52	190
55-340	323	NO 7-4	2304.00	5,693.18	51	190
55-341	324	NO 7-4	2304.00	5,693.18	50	195
55-342	325	NO 7-4	2304.00	5,693.18	49	200
55-343	326	NO 7-4	2304.00	5,693.18	48	220
55-344	327	NO 7-4	2304.00	5,693.18	45	235
55-345	328	NO 7-4	2304.00	5,693.18	43	230
55-346	329	NO 7-4	2304.00	5,693.18	41	230
55-347	330	NO 7-4	2304.00	5,693.18	40	220
55-348	331	NO 7-4	2304.00	5,693.18	38	180
55-349	332	NO 7-4	2304.00	5,693.18	37	140
55-350	333	NO 7-4	2304.00	5,693.18	36	120
TOTAL	350 Blocks		792,085.00	1,957,242.02		

Alternative IV
289 Blocks

	Block No.	Lease Map No.	Hectares	Acres	Miles From Shore	Depth In Meters
Icy Bay						
55-1	704	NO 7-1	2304.00	5,693.18	25	200
55-2	740	NO 7-1	2304.00	5,693.18	39	200
55-3	741	NO 7-1	2304.00	5,693.18	39	240
55-4	742	NO 7-1	2304.00	5,693.18	37	260
55-5	743	NO 7-1	2304.00	5,693.18	36	315
55-6	744	NO 7-1	2304.00	5,693.18	35	350
55-7	748	NO 7-1	2304.00	5,693.18	31	170
55-8	784	NO 7-1	2304.00	5,693.18	44	250
55-9	785	NO 7-1	2304.00	5,693.18	42	250
55-10	786	NO 7-1	2304.00	5,693.18	41	290
55-11	787	NO 7-1	2304.00	5,693.18	39	310
55-12	788	NO 7-1	2304.00	5,693.18	38	340
55-13	789	NO 7-1	2304.00	5,693.18	36	320
55-14	790	NO 7-1	2304.00	5,693.18	35	300
55-15	791	NO 7-1	2304.00	5,693.18	35	210
55-16	792	NO 7-1	2304.00	5,693.18	34	185
55-17	829	NO 7-1	2304.00	5,693.18	45	275
55-18	830	NO 7-1	2304.00	5,693.18	43	290
55-19	831	NO 7-1	2304.00	5,693.18	42	310
55-20	832	NO 7-1	2304.00	5,693.18	40	340
55-21	833	NO 7-1	2304.00	5,693.18	39	330
55-22	834	NO 7-1	2304.00	5,693.18	38	300
55-23	835	NO 7-1	2304.00	5,693.18	38	225
55-24	836	NO 7-1	2304.00	5,693.18	37	195
55-25	874	NO 7-1	2304.00	5,693.18	46	300
55-26	875	NO 7-1	2304.00	5,693.18	45	315
55-27	876	NO 7-1	2304.00	5,693.18	43	340
55-28	877	NO 7-1	2304.00	5,693.18	42	340
55-29	878	NO 7-1	2304.00	5,693.18	41	300
55-30	879	NO 7-1	2304.00	5,693.18	40	225
55-31	880	NO 7-1	2304.00	5,693.18	40	190
55-32	919	NO 7-1	2304.00	5,693.18	47	375
55-33	920	NO 7-1	2304.00	5,693.18	46	375
55-34	921	NO 7-1	2304.00	5,693.18	45	320
55-35	922	NO 7-1	2304.00	5,693.18	44	275
55-36	923	NO 7-1	2304.00	5,693.18	43	200
55-37	924	NO 7-1	2304.00	5,693.18	43	190
Yakutat						
55-38	661	NO 7-2	2304.00	5,693.18	27	170
55-39	662	NO 7-2	2304.00	5,693.18	26	160
55-40	663	NO 7-2	2304.00	5,693.18	26	155
55-41	664	NO 7-2	2304.00	5,693.18	25	150

	Block No.	Lease Map No.	Hectares	Acres	Miles From Shore	Depth In Meters
55-42	665	NO 7-2	2304.00	5,693.18	25	145
55-43	705	NO 7-2	2304.00	5,693.18	30	170
55-44	706	NO 7-2	2304.00	5,693.18	29	160
55-45	707	NO 7-2	2304.00	5,693.18	29	150
55-46	708	NO 7-2	2304.00	5,693.18	28	145
55-47	709	NO 7-2	2304.00	5,693.18	28	140
55-48	710	NO 7-2	2304.00	5,693.18	28	135
55-53	749	NO 7-2	2304.00	5,693.18	33	175
55-54	750	NO 7-2	2304.00	5,693.18	32	165
55-55	751	NO 7-2	2304.00	5,693.18	32	155
55-56	752	NO 7-2	2304.00	5,693.18	31	145
55-57	753	NO 7-2	2304.00	5,693.18	31	145
55-58	754	NO 7-2	2304.00	5,693.18	31	135
55-59	755	NO 7-2	2304.00	5,693.18	31	135
55-60	756	NO 7-2	2304.00	5,693.18	27	130
55-70	793	NO 7-2	2304.00	5,693.18	36	185
55-71	794	NO 7-2	2304.00	5,693.18	35	170
55-72	795	NO 7-2	2304.00	5,693.18	35	160
55-73	796	NO 7-2	2304.00	5,693.18	35	145
55-74	797	NO 7-2	2304.00	5,693.18	34	145
55-75	798	NO 7-2	2304.00	5,693.18	33	140
55-76	799	NO 7-2	2304.00	5,693.18	31	135
55-77	800	NO 7-2	2304.00	5,693.18	29	130
55-78	801	NO 7-2	2304.00	5,693.18	27	125
55-79	802	NO 7-2	2304.00	5,693.18	26	125
55-80	803	NO 7-2	2304.00	5,693.18	24	120
55-81	804	NO 7-2	2304.00	5,693.18	22	120
55-82	805	NO 7-2	2304.00	5,693.18	21	125
55-83	806	NO 7-2	2304.00	5,693.18	19	130
55-84	807	NO 7-2	2304.00	5,693.18	17	140
55-96	837	NO 7-2	2304.00	5,693.18	40	185
55-97	838	NO 7-2	2304.00	5,693.18	39	175
55-98	839	NO 7-2	2304.00	5,693.18	38	162
55-99	840	NO 7-2	2304.00	5,693.18	38	150
55-100	841	NO 7-2	2304.00	5,693.18	38	145
55-101	842	NO 7-2	2304.00	5,693.18	35	140
55-102	843	NO 7-2	2304.00	5,693.18	34	137
55-103	844	NO 7-2	2304.00	5,693.18	32	130
55-104	845	NO 7-2	2304.00	5,693.18	30	126
55-105	846	NO 7-2	2304.00	5,693.18	29	120
55-106	847	NO 7-2	2304.00	5,693.18	27	120
55-107	848	NO 7-2	2304.00	5,693.18	25	120
55-108	849	NO 7-2	2304.00	5,693.18	23	120
55-109	850	NO 7-2	2304.00	5,693.18	21	120
55-110	851	NO 7-2	2304.00	5,693.18	20	130
55-111	852	NO 7-2	2304.00	5,693.18	18	130
55-122	881	NO 7-2	2304.00	5,693.18	42	195
55-123	882	NO 7-2	2304.00	5,693.18	42	175
55-124	883	NO 7-2	2304.00	5,693.18	41	165
55-125	884	NO 7-2	2304.00	5,693.18	41	155
55-126	885	NO 7-2	2304.00	5,693.18	40	145

	Block No.	Lease Map No.	Hectares	Acres	Miles From Shore	Depth In Meters
55-127	886	NO 7-2	2304.00	5,693.18	38	140
55-128	887	NO 7-2	2304.00	5,693.18	36	140
55-129	888	NO 7-2	2304.00	5,693.18	34	137
55-130	889	NO 7-2	2304.00	5,693.18	33	130
55-131	890	NO 7-2	2304.00	5,693.18	31	125
55-132	891	NO 7-2	2304.00	5,693.18	29	120
55-133	892	NO 7-2	2304.00	5,693.18	28	120
55-134	893	NO 7-2	2304.00	5,693.18	26	120
55-135	894	NO 7-2	2304.00	5,693.18	24	120
55-136	895	NO 7-2	2304.00	5,693.18	22	120
55-137	896	NO 7-2	2304.00	5,693.18	21	120
55-138	897	NO 7-2	2304.00	5,693.18	19	120
55-139	898	NO 7-2	2304.00	5,693.18	18	120
55-148	930	NO 7-2	2304.00	5,693.18	40	145
55-149	931	NO 7-2	2304.00	5,693.18	38	140
55-150	932	NO 7-2	2304.00	5,693.18	37	140
55-151	933	NO 7-2	2304.00	5,693.18	35	135
55-152	934	NO 7-2	2304.00	5,693.18	33	130
55-153	935	NO 7-2	2304.00	5,693.18	32	130
55-154	936	NO 7-2	2304.00	5,693.18	30	130
55-155	937	NO 7-2	2304.00	5,693.18	28	130
55-156	938	NO 7-2	2304.00	5,693.18	27	125
55-157	939	NO 7-2	2304.00	5,693.18	25	120
55-158	940	NO 7-2	2304.00	5,693.18	22	125
55-159	941	NO 7-2	2304.00	5,693.18	22	130
55-160	942	NO 7-2	2304.00	5,693.18	20	120
55-161	943	NO 7-2	2304.00	5,693.18	20	115
55-162	944	NO 7-2	2304.00	5,693.18	19	110
55-163	945	NO 7-2	2304.00	5,693.18	17	100
55-164	946	NO 7-2	2304.00	5,693.18	16	90
55-171	974	NO 7-2	2304.00	5,693.18	42	155
55-172	975	NO 7-2	2304.00	5,693.18	41	145
55-173	976	NO 7-2	2304.00	5,693.18	40	140
55-174	977	NO 7-2	2304.00	5,693.18	38	137
55-175	978	NO 7-2	2304.00	5,693.18	36	140
55-176	979	NO 7-2	2304.00	5,693.18	35	135
55-177	980	NO 7-2	2304.00	5,693.18	33	135
55-178	981	NO 7-2	2304.00	5,693.18	31	135
55-179	982	NO 7-2	2304.00	5,693.18	29	130
55-180	983	NO 7-2	2304.00	5,693.18	28	125
55-181	984	NO 7-2	2304.00	5,693.18	26	125
55-182	985	NO 7-2	2304.00	5,693.18	25	125
55-183	986	NO 7-2	2304.00	5,693.18	23	120
55-184	987	NO 7-2	2304.00	5,693.18	22	115
55-185	988	NO 7-2	2304.00	5,693.18	21	110
55-186	989	NO 7-2	2304.00	5,693.18	20	105
55-187	990	NO 7-2	2304.00	5,693.18	18	100
55-188	991	NO 7-2	2304.00	5,693.18	17	90
55-194	1018	NO 7-2	2304.00	5,693.18	45	170
55-195	1019	NO 7-2	2304.00	5,693.18	44	165
55-196	1020	NO 7-2	2304.00	5,693.18	42	160

	Block No.	Lease Map No.	Hectares	Acres	Miles From Shore	Depth In Meters
55-197	1021	NO 7-2	2304.00	5,693.18	40	150
55-198	1022	NO 7-2	2304.00	5,693.18	38	145
55-199	1023	NO 7-2	2304.00	5,693.18	37	145
55-200	1024	NO 7-2	2304.00	5,693.18	35	140
55-201	1025	NO 7-2	2304.00	5,693.18	33	140
55-202	1026	NO 7-2	2304.00	5,693.18	32	135
55-203	1027	NO 7-2	2304.00	5,693.18	30	135
55-204	1028	NO 7-2	2304.00	5,693.18	29	130
55-205	1029	NO 7-2	2304.00	5,693.18	27	125
55-206	1030	NO 7-2	2304.00	5,693.18	26	120
55-207	1031	NO 7-2	2304.00	5,693.18	25	115
55-208	1032	NO 7-2	2304.00	5,693.18	24	115
55-209	1033	NO 7-2	2304.00	5,693.18	22	110
55-210	1034	NO 7-2	2304.00	5,693.18	21	110
55-211	1035	NO 7-2	2304.00	5,693.18	20	105
55-212	1036	NO 7-2	2304.00	5,693.18	18	110
Alsek Valley						
55-217	6	NO 7-4	2304.00	5,693.18	47	180
55-218	7	NO 7-4	2304.00	5,693.18	45	175
55-219	8	NO 7-4	2304.00	5,693.18	44	170
55-220	9	NO 7-4	2304.00	5,693.18	42	165
55-221	10	NO 7-4	2304.00	5,693.18	40	160
55-222	11	NO 7-4	2304.00	5,693.18	38	160
55-223	12	NO 7-4	2304.00	5,693.18	37	155
55-224	13	NO 7-4	2304.00	5,693.18	35	145
55-225	14	NO 7-4	2304.00	5,693.18	33	140
55-226	15	NO 7-4	2304.00	5,693.18	32	140
55-227	16	NO 7-4	2304.00	5,693.18	31	135
55-228	17	NO 7-4	2304.00	5,693.18	30	130
55-229	18	NO 7-4	2304.00	5,693.18	28	125
55-230	19	NO 7-4	2304.00	5,693.18	27	120
55-231	20	NO 7-4	2304.00	5,693.18	26	120
55-232	21	NO 7-4	2304.00	5,693.18	25	115
55-233	22	NO 7-4	2304.00	5,693.18	23	110
55-234	23	NO 7-4	2304.00	5,693.18	21	110
55-235	24	NO 7-4	2304.00	5,693.18	19	120
55-240	54	NO 7-4	2304.00	5,693.18	43	165
55-241	55	NO 7-4	2304.00	5,693.18	41	162
55-242	56	NO 7-4	2304.00	5,693.18	39	160
55-243	57	NO 7-4	2304.00	5,693.18	38	155
55-244	58	NO 7-4	2304.00	5,693.18	36	152
55-245	59	NO 7-4	2304.00	5,693.18	35	150
55-246	60	NO 7-4	2304.00	5,693.18	34	140
55-247	61	NO 7-4	2304.00	5,693.18	32	135
55-248	62	NO 7-4	2304.00	5,693.18	31	130
55-249	63	NO 7-4	2304.00	5,693.18	30	120
55-250	64	NO 7-4	2304.00	5,693.18	29	120
55-251	65	NO 7-4	2304.00	5,693.18	28	120
55-252	66	NO 7-4	2304.00	5,693.18	26	120

	Block No.	Lease Map No.	Hectares	Acres	Miles From Shore	Depth In Meters
55-253	67	NO 7-4	2304.00	5,693.18	24	120
55-254	68	NO 7-4	2304.00	5,693.18	22	135
55-255	69	NO 7-4	2304.00	5,693.18	20	185
55-256	98	NO 7-4	2304.00	5,693.18	45	180
55-257	99	NO 7-4	2304.00	5,693.18	43	170
55-258	100	NO 7-4	2304.00	5,693.18	42	170
55-259	101	NO 7-4	2304.00	5,693.18	40	165
55-260	102	NO 7-4	2304.00	5,693.18	39	160
55-261	103	NO 7-4	2304.00	5,693.18	38	155
55-262	104	NO 7-4	2304.00	5,693.18	36	155
55-263	105	NO 7-4	2304.00	5,693.18	35	150
55-264	106	NO 7-4	2304.00	5,693.18	34	140
55-265	107	NO 7-4	2304.00	5,693.18	33	135
55-266	108	NO 7-4	2304.00	5,693.18	32	130
55-267	109	NO 7-4	2304.00	5,693.18	30	120
55-268	110	NO 7-4	2304.00	5,693.18	28	120
55-269	111	NO 7-4	2304.00	5,693.18	26	125
55-270	112	NO 7-4	2304.00	5,693.18	24	175
55-271	113	NO 7-4	2304.00	5,693.18	22	210
55-272	142	NO 7-4	2304.00	5,693.18	48	185
55-273	143	NO 7-4	2304.00	5,693.18	46	180
55-274	144	NO 7-4	2304.00	5,693.18	45	177
55-275	145	NO 7-4	2304.00	5,693.18	43	175
55-276	146	NO 7-4	2304.00	5,693.18	42	170
55-277	147	NO 7-4	2304.00	5,693.18	40	165
55-278	148	NO 7-4	2304.00	5,693.18	39	160
55-279	149	NO 7-4	2304.00	5,693.18	38	155
55-280	150	NO 7-4	2304.00	5,693.18	37	150
55-281	151	NO 7-4	2304.00	5,693.18	36	140
55-282	152	NO 7-4	2304.00	5,693.18	34	140
55-283	153	NO 7-4	2304.00	5,693.18	32	135
55-284	154	NO 7-4	2304.00	5,693.18	30	135
55-285	155	NO 7-4	2304.00	5,693.18	28	175
55-286	156	NO 7-4	2304.00	5,693.18	27	205
55-287	157	NO 7-4	2304.00	5,693.18	25	220
55-288	186	NO 7-4	2304.00	5,693.18	50	190
55-289	187	NO 7-4	2304.00	5,693.18	49	185
55-290	188	NO 7-4	2304.00	5,693.18	47	185
55-291	189	NO 7-4	2304.00	5,693.18	46	180
55-292	190	NO 7-4	2304.00	5,693.18	44	175
55-293	191	NO 7-4	2304.00	5,693.18	43	170
55-294	192	NO 7-4	2304.00	5,693.18	42	170
55-295	193	NO 7-4	2304.00	5,693.18	41	170
55-296	194	NO 7-4	2304.00	5,693.18	39	165
55-297	195	NO 7-4	2304.00	5,693.18	38	155
55-298	196	NO 7-4	2304.00	5,693.18	37	155
55-299	197	NO 7-4	2304.00	5,693.18	34	175
55-300	198	NO 7-4	2304.00	5,693.18	32	200
55-301	199	NO 7-4	2304.00	5,693.18	31	210
55-302	200	NO 7-4	2304.00	5,693.18	29	220
55-303	201	NO 7-4	2304.00	5,693.18	28	220

	Block No.	Lease Map No.	Hectares	Acres	Miles From Shore	Depth In Meters
55-304	230	NO 7-4	2304.00	5,693.18	53	190
55-305	231	NO 7-4	2304.00	5,693.18	51	185
55-306	232	NO 7-4	2304.00	5,693.18	50	185
55-307	233	NO 7-4	2304.00	5,693.18	48	180
55-308	234	NO 7-4	2304.00	5,693.18	47	180
55-309	235	NO 7-4	2304.00	5,693.18	46	180
55-310	236	NO 7-4	2304.00	5,693.18	45	177
55-311	237	NO 7-4	2304.00	5,693.18	44	177
55-312	238	NO 7-4	2304.00	5,693.18	42	175
55-313	239	NO 7-4	2304.00	5,693.18	41	180
55-314	240	NO 7-4	2304.00	5,693.18	39	190
55-315	241	NO 7-4	2304.00	5,693.18	37	210
55-316	242	NO 7-4	2304.00	5,693.18	35	220
55-317	243	NO 7-4	2304.00	5,693.18	33	220
55-318	244	NO 7-4	2304.00	5,693.18	32	220
55-319	245	NO 7-4	2304.00	5,693.18	31	210
55-320	274	NO 7-4	2304.00	5,693.18	55	200
55-321	275	NO 7-4	2304.00	5,693.18	54	195
55-322	276	NO 7-4	2304.00	5,693.18	52	190
55-323	277	NO 7-4	2304.00	5,693.18	51	185
55-324	278	NO 7-4	2304.00	5,693.18	50	185
55-325	279	NO 7-4	2304.00	5,693.18	49	185
55-326	280	NO 7-4	2304.00	5,693.18	47	185
55-327	281	NO 7-4	2304.00	5,693.18	46	185
55-328	282	NO 7-4	2304.00	5,693.18	45	190
55-329	283	NO 7-4	2304.00	5,693.18	43	210
55-330	284	NO 7-4	2304.00	5,693.18	41	210
55-331	285	NO 7-4	2304.00	5,693.18	39	220
55-332	286	NO 7-4	2304.00	5,693.18	37	240
55-333	287	NO 7-4	2304.00	5,693.18	36	220
55-334	288	NO 7-4	2304.00	5,693.18	35	180
55-335	318	NO 7-4	2304.00	5,693.18	58	400
55-336	319	NO 7-4	2304.00	5,693.18	56	250
55-337	320	NO 7-4	2304.00	5,693.18	55	195
55-338	321	NO 7-4	2304.00	5,693.18	54	190
55-339	322	NO 7-4	2304.00	5,693.18	52	190
55-340	323	NO 7-4	2304.00	5,693.18	51	190
55-341	324	NO 7-4	2304.00	5,693.18	50	195
55-342	325	NO 7-4	2304.00	5,693.18	49	200
55-343	326	NO 7-4	2304.00	5,693.18	48	220
55-344	327	NO 7-4	2304.00	5,693.18	45	235
55-345	328	NO 7-4	2304.00	5,693.18	43	230
55-346	329	NO 7-4	2304.00	5,693.18	41	230
55-347	330	NO 7-4	2304.00	5,693.18	40	220
55-348	331	NO 7-4	2304.00	5,693.18	38	180
55-349	332	NO 7-4	2304.00	5,693.18	37	140
55-350	333	NO 7-4	2304.00	5,693.18	36	120
TOTAL	289 Blocks		667,737.00	1,649,978.00		

Alternative V
218 Blocks

	Block No.	Lease Map No.	Hectares	Acres	Miles From Shore	Depth In Meters
Yakutat						
55-75	798	NO 7-2	2304.00	5,693.18	33	140
55-76	799	NO 7-2	2304.00	5,693.18	31	135
55-77	800	NO 7-2	2304.00	5,693.18	29	130
55-78	801	NO 7-2	2304.00	5,693.18	27	125
55-79	802	NO 7-2	2304.00	5,693.18	26	125
55-80	803	NO 7-2	2304.00	5,693.18	24	120
55-81	804	NO 7-2	2304.00	5,693.18	22	120
55-82	805	NO 7-2	2304.00	5,693.18	21	125
55-83	806	NO 7-2	2304.00	5,693.18	19	130
55-84	807	NO 7-2	2304.00	5,693.18	17	140
55-101	842	NO 7-2	2304.00	5,693.18	35	140
55-102	843	NO 7-2	2304.00	5,693.18	34	137
55-103	844	NO 7-2	2304.00	5,693.18	32	130
55-104	845	NO 7-2	2304.00	5,693.18	30	126
55-105	846	NO 7-2	2304.00	5,693.18	29	120
55-106	847	NO 7-2	2304.00	5,693.18	27	120
55-107	848	NO 7-2	2304.00	5,693.18	25	120
55-108	849	NO 7-2	2304.00	5,693.18	23	120
55-109	850	NO 7-2	2304.00	5,693.18	21	120
55-110	851	NO 7-2	2304.00	5,693.18	20	130
55-111	852	NO 7-2	2304.00	5,693.18	18	130
55-127	886	NO 7-2	2304.00	5,693.18	38	140
55-128	887	NO 7-2	2304.00	5,693.18	36	140
55-129	888	NO 7-2	2304.00	5,693.18	34	137
55-130	889	NO 7-2	2304.00	5,693.18	33	130
55-131	890	NO 7-2	2304.00	5,693.18	31	125
55-132	891	NO 7-2	2304.00	5,693.18	29	120
55-133	892	NO 7-2	2304.00	5,693.18	28	120
55-134	893	NO 7-2	2304.00	5,693.18	26	120
55-135	894	NO 7-2	2304.00	5,693.18	24	120
55-136	895	NO 7-2	2304.00	5,693.18	22	120
55-137	896	NO 7-2	2304.00	5,693.18	21	120
55-138	897	NO 7-2	2304.00	5,693.18	19	120
55-139	898	NO 7-2	2304.00	5,693.18	18	120
55-148	930	NO 7-2	2304.00	5,693.18	40	145
55-149	931	NO 7-2	2304.00	5,693.18	38	140
55-150	932	NO 7-2	2304.00	5,693.18	37	140
55-151	933	NO 7-2	2304.00	5,693.18	35	135
55-152	934	NO 7-2	2304.00	5,693.18	33	130
55-153	935	NO 7-2	2304.00	5,693.18	32	130
55-154	936	NO 7-2	2304.00	5,693.18	30	130
55-155	937	NO 7-2	2304.00	5,693.18	28	130
55-156	938	NO 7-2	2304.00	5,693.18	27	125

	Block No.	Lease Map No.	Hectares	Acres	Miles From Shore	Depth In Meters
55-157	939	NO 7-2	2304.00	5,693.18	25	120
55-158	940	NO 7-2	2304.00	5,693.18	22	125
55-159	941	NO 7-2	2304.00	5,693.18	22	130
55-160	942	NO 7-2	2304.00	5,693.18	20	120
55-161	943	NO 7-2	2304.00	5,693.18	20	115
55-162	944	NO 7-2	2304.00	5,693.18	19	110
55-163	945	NO 7-2	2304.00	5,693.18	17	100
55-164	946	NO 7-2	2304.00	5,693.18	16	90
55-171	974	NO 7-2	2304.00	5,693.18	42	155
55-172	975	NO 7-2	2304.00	5,693.18	41	145
55-173	976	NO 7-2	2304.00	5,693.18	40	140
55-174	977	NO 7-2	2304.00	5,693.18	38	137
55-175	978	NO 7-2	2304.00	5,693.18	36	140
55-176	979	NO 7-2	2304.00	5,693.18	35	135
55-177	980	NO 7-2	2304.00	5,693.18	33	135
55-178	981	NO 7-2	2304.00	5,693.18	31	135
55-179	982	NO 7-2	2304.00	5,693.18	29	130
55-180	983	NO 7-2	2304.00	5,693.18	28	125
55-181	984	NO 7-2	2304.00	5,693.18	26	125
55-182	985	NO 7-2	2304.00	5,693.18	25	125
55-183	986	NO 7-2	2304.00	5,693.18	23	120
55-184	987	NO 7-2	2304.00	5,693.18	22	115
55-185	988	NO 7-2	2304.00	5,693.18	21	110
55-186	989	NO 7-2	2304.00	5,693.18	20	105
55-187	990	NO 7-2	2304.00	5,693.18	18	100
55-188	991	NO 7-2	2304.00	5,693.18	17	90
55-194	1018	NO 7-2	2304.00	5,693.18	45	170
55-195	1019	NO 7-2	2304.00	5,693.18	44	165
55-196	1020	NO 7-2	2304.00	5,693.18	42	160
55-197	1021	NO 7-2	2304.00	5,693.18	40	150
55-198	1022	NO 7-2	2304.00	5,693.18	38	145
55-199	1023	NO 7-2	2304.00	5,693.18	37	145
55-200	1024	NO 7-2	2304.00	5,693.18	35	140
55-201	1025	NO 7-2	2304.00	5,693.18	33	140
55-202	1026	NO 7-2	2304.00	5,693.18	32	135
55-203	1027	NO 7-2	2304.00	5,693.18	30	135
55-204	1028	NO 7-2	2304.00	5,693.18	29	130
55-205	1029	NO 7-2	2304.00	5,693.18	27	125
55-206	1030	NO 7-2	2304.00	5,693.18	26	120
55-207	1031	NO 7-2	2304.00	5,693.18	25	115
55-208	1032	NO 7-2	2304.00	5,693.18	24	115
55-209	1033	NO 7-2	2304.00	5,693.18	22	110
55-210	1034	NO 7-2	2304.00	5,693.18	21	110
55-211	1035	NO 7-2	2304.00	5,693.18	20	105
55-212	1036	NO 7-2	2304.00	5,693.18	18	110
Alsek Valley						
55-217	6	NO 7-4	2304.00	5,693.18	47	180
55-218	7	NO 7-4	2304.00	5,693.18	45	175
55-219	8	NO 7-4	2304.00	5,693.18	44	170

	Block No.	Lease Map No.	Hectares	Acres	Miles From Shore	Depth In Meters
55-220	9	NO 7-4	2304.00	5,693.18	42	165
55-221	10	NO 7-4	2304.00	5,693.18	40	160
55-222	11	NO 7-4	2304.00	5,693.18	38	160
55-223	12	NO 7-4	2304.00	5,693.18	37	155
55-224	13	NO 7-4	2304.00	5,693.18	35	145
55-225	14	NO 7-4	2304.00	5,693.18	33	140
55-226	15	NO 7-4	2304.00	5,693.18	32	140
55-227	16	NO 7-4	2304.00	5,693.18	31	135
55-228	17	NO 7-4	2304.00	5,693.18	30	130
55-229	18	NO 7-4	2304.00	5,693.18	28	125
55-230	19	NO 7-4	2304.00	5,693.18	27	120
55-231	20	NO 7-4	2304.00	5,693.18	26	120
55-232	21	NO 7-4	2304.00	5,693.18	25	115
55-233	22	NO 7-4	2304.00	5,693.18	23	110
55-234	23	NO 7-4	2304.00	5,693.18	21	110
55-235	24	NO 7-4	2304.00	5,693.18	19	120
55-240	54	NO 7-4	2304.00	5,693.18	43	165
55-241	55	NO 7-4	2304.00	5,693.18	41	162
55-242	56	NO 7-4	2304.00	5,693.18	39	160
55-243	57	NO 7-4	2304.00	5,693.18	38	155
55-244	58	NO 7-4	2304.00	5,693.18	36	152
55-245	59	NO 7-4	2304.00	5,693.18	35	150
55-246	60	NO 7-4	2304.00	5,693.18	34	140
55-247	61	NO 7-4	2304.00	5,693.18	32	135
55-248	62	NO 7-4	2304.00	5,693.18	31	130
55-249	63	NO 7-4	2304.00	5,693.18	30	120
55-250	64	NO 7-4	2304.00	5,693.18	29	120
55-251	65	NO 7-4	2304.00	5,693.18	28	120
55-252	66	NO 7-4	2304.00	5,693.18	26	120
55-253	67	NO 7-4	2304.00	5,693.18	24	120
55-254	68	NO 7-4	2304.00	5,693.18	22	135
55-255	69	NO 7-4	2304.00	5,693.18	20	185
55-256	98	NO 7-4	2304.00	5,693.18	45	180
55-257	99	NO 7-4	2304.00	5,693.18	43	170
55-258	100	NO 7-4	2304.00	5,693.18	42	170
55-259	101	NO 7-4	2304.00	5,693.18	40	165
55-260	102	NO 7-4	2304.00	5,693.18	39	160
55-261	103	NO 7-4	2304.00	5,693.18	38	155
55-262	104	NO 7-4	2304.00	5,693.18	36	155
55-263	105	NO 7-4	2304.00	5,693.18	35	150
55-264	106	NO 7-4	2304.00	5,693.18	34	140
55-265	107	NO 7-4	2304.00	5,693.18	33	135
55-266	108	NO 7-4	2304.00	5,693.18	32	130
55-267	109	NO 7-4	2304.00	5,693.18	30	120
55-268	110	NO 7-4	2304.00	5,693.18	28	120
55-269	111	NO 7-4	2304.00	5,693.18	26	125
55-270	112	NO 7-4	2304.00	5,693.18	24	175
55-271	113	NO 7-4	2304.00	5,693.18	22	210
55-272	142	NO 7-4	2304.00	5,693.18	48	185
55-273	143	NO 7-4	2304.00	5,693.18	46	180

	Block No.	Lease Map No.	Hectares	Acres	Miles From Shore	Depth In Meters
55-274	144	NO 7-4	2304.00	5,693.18	45	177
55-275	145	NO 7-4	2304.00	5,693.18	43	175
55-276	146	NO 7-4	2304.00	5,693.18	42	170
55-277	147	NO 7-4	2304.00	5,693.18	40	165
55-278	148	NO 7-4	2304.00	5,693.18	39	160
55-279	149	NO 7-4	2304.00	5,693.18	38	155
55-280	150	NO 7-4	2304.00	5,693.18	37	150
55-281	151	NO 7-4	2304.00	5,693.18	36	140
55-282	152	NO 7-4	2304.00	5,693.18	34	140
55-283	153	NO 7-4	2304.00	5,693.18	32	135
55-284	154	NO 7-4	2304.00	5,693.18	30	135
55-285	155	NO 7-4	2304.00	5,693.18	28	175
55-286	156	NO 7-4	2304.00	5,693.18	27	205
55-287	157	NO 7-4	2304.00	5,693.18	25	220
55-288	186	NO 7-4	2304.00	5,693.18	50	190
55-289	187	NO 7-4	2304.00	5,693.18	49	185
55-290	188	NO 7-4	2304.00	5,693.18	47	185
55-291	189	NO 7-4	2304.00	5,693.18	46	180
55-292	190	NO 7-4	2304.00	5,693.18	44	175
55-293	191	NO 7-4	2304.00	5,693.18	43	170
55-294	192	NO 7-4	2304.00	5,693.18	42	170
55-295	193	NO 7-4	2304.00	5,693.18	41	170
55-296	194	NO 7-4	2304.00	5,693.18	39	165
55-297	195	NO 7-4	2304.00	5,693.18	38	155
55-298	196	NO 7-4	2304.00	5,693.18	37	155
55-299	197	NO 7-4	2304.00	5,693.18	34	175
55-300	198	NO 7-4	2304.00	5,693.18	32	200
55-301	199	NO 7-4	2304.00	5,693.18	31	210
55-302	200	NO 7-4	2304.00	5,693.18	29	220
55-303	201	NO 7-4	2304.00	5,693.18	28	220
55-304	230	NO 7-4	2304.00	5,693.18	53	190
55-305	231	NO 7-4	2304.00	5,693.18	51	185
55-306	232	NO 7-4	2304.00	5,693.18	50	185
55-307	233	NO 7-4	2304.00	5,693.18	48	180
55-308	234	NO 7-4	2304.00	5,693.18	47	180
55-309	235	NO 7-4	2304.00	5,693.18	46	180
55-310	236	NO 7-4	2304.00	5,693.18	45	177
55-311	237	NO 7-4	2304.00	5,693.18	44	177
55-312	238	NO 7-4	2304.00	5,693.18	42	175
55-313	239	NO 7-4	2304.00	5,693.18	41	180
55-314	240	NO 7-4	2304.00	5,693.18	39	190
55-315	241	NO 7-4	2304.00	5,693.18	37	210
55-316	242	NO 7-4	2304.00	5,693.18	35	220
55-317	243	NO 7-4	2304.00	5,693.18	33	220
55-318	244	NO 7-4	2304.00	5,693.18	32	220
55-319	245	NO 7-4	2304.00	5,693.18	31	210
55-320	274	NO 7-4	2304.00	5,693.18	55	200
55-321	275	NO 7-4	2304.00	5,693.18	54	195
55-322	276	NO 7-4	2304.00	5,693.18	52	190
55-323	277	NO 7-4	2304.00	5,693.18	51	185

	Block No.	Lease Map No.	Hectares	Acres	Miles From Shore	Depth In Meters
55-324	278	NO 7-4	2304.00	5,693.18	50	185
55-325	279	NO 7-4	2304.00	5,693.18	49	185
55-326	280	NO 7-4	2304.00	5,693.18	47	185
55-327	281	NO 7-4	2304.00	5,693.18	46	185
55-328	282	NO 7-4	2304.00	5,693.18	45	190
55-329	283	NO 7-4	2304.00	5,693.18	43	210
55-330	284	NO 7-4	2304.00	5,693.18	41	210
55-331	285	NO 7-4	2304.00	5,693.18	39	220
55-332	286	NO 7-4	2304.00	5,693.18	37	240
55-333	287	NO 7-4	2304.00	5,693.18	36	220
55-334	288	NO 7-4	2304.00	5,693.18	35	180
55-335	318	NO 7-4	2304.00	5,693.18	58	400
55-336	319	NO 7-4	2304.00	5,693.18	56	250
55-337	320	NO 7-4	2304.00	5,693.18	55	195
55-338	321	NO 7-4	2304.00	5,693.18	54	190
55-339	322	NO 7-4	2304.00	5,693.18	52	190
55-340	323	NO 7-4	2304.00	5,693.18	51	190
55-341	324	NO 7-4	2304.00	5,693.18	50	195
55-342	325	NO 7-4	2304.00	5,693.18	49	200
55-343	326	NO 7-4	2304.00	5,693.18	48	220
55-344	327	NO 7-4	2304.00	5,693.18	45	235
55-345	328	NO 7-4	2304.00	5,693.18	43	230
55-346	329	NO 7-4	2304.00	5,693.18	41	230
55-347	330	NO 7-4	2304.00	5,693.18	40	220
55-348	331	NO 7-4	2304.00	5,693.18	38	180
55-349	332	NO 7-4	2304.00	5,693.18	37	140
55-350	333	NO 7-4	2304.00	5,693.18	36	120
TOTAL	218 Blocks		504,153.00	1,245,762.00		

APPENDIX D

STATE AND REGIONAL ECONOMIES AND THEIR IMPACTS

This particular appendix considers in great detail descriptions of the state and regional economic environment, the impacts of the minimum and maximum development scenarios on state and regional employment and overall economic environment, and the future economic environment on a state and regional basis under the heading of Impact of No-Sale Case.

1. State Economic Environment: The following description of the Alaskan state and regional economy is taken in part from a BLM OCS Socioeconomic Studies Program report, written by the Institute of Social and Economic Research of the University of Alaska. This report is referenced in table D-3.

Alaska's economy expanded rapidly from 1965 to 1976. The major industries responsible for this growth were construction and mining. Development of the Cook Inlet oil fields was important in the early part of the period, while the development of Prudhoe Bay influenced economic growth significantly during the latter part of the period.

The expansion of state government between 1970 and 1972 contributed to the state economic growth. The construction of the Trans-Alaska Pipeline was the most important factor influencing economic growth during the latter part of this period. The economy experienced its fastest growth during 1975-77 -- the period of peak pipeline employment.

The Alaska growth process consists of growth-initiating factors and the response of the economy to these factors. The major cause of growth is expansion of the basic sector industries--mining, construction, manufacturing, agriculture-forestry-fisheries, and Federal Government. The response to change in these sectors occurs with the expansion of activity in the support sectors, such as trade, finance, residential and commercial construction, and state and local government. Over the historical period, the response of the support sector has been nonproportional to the growth in the basic sector. The support sector has expanded its share of the economy as a result of the increased scale of the economy, which allows more local production of goods and services. This type of structural change can be expected to continue in the future.

The growth associated with the 1965-76 period affected population, unemployment, and personal income. Population increased primarily because of immigration, in response to the increased economic opportunities. However, population did not respond as rapidly as employment growth; this was a result of a change in the character of the population. The increase in the population occurred mostly in the working ages. Unemployment was only minimally affected during that period; the unemployment rate fell only during the period of most rapid growth in 1975. The seasonality component of unemployment fell throughout the period primarily as a result of the increased importance of the less seasonal support industries. Growth increased real personal incomes, so that for most of the period, it increased faster than the U.S. average.

The existing economic conditions in Alaska reflect the end of work on the Trans-Alaska Pipeline System (TAPS) project. The project was completed in 1977, but peak employment on the pipeline project occurred in 1976. The decline in construction employment between 1976 and 1977 illustrates the significance of TAPS to the economy. Construction employment fell by 35.4 percent from 30,200 in 1976 to 19,500 in 1977 (Alaska Department of Labor, 1978).

Although the economy experienced a decline in total employment, the drop was not as great as would have been expected, given the response the economy experienced during the pipeline buildup. Nonconstruction employment actually rose between 1976 and 1977. Total nonagricultural wage and salary employment fell by only 7,000, or only 65 percent of the decline in construction employment; nonconstruction employment increased by 3,700. This increase was a result of the expansion of both the basic sector and the support sector.

The major basic sector to expand was mining, which increased by 1,000 employees because of the continued development of the Prudhoe Bay fields and the preparation for further exploration activity. This increase included substantial expansion of headquarters employment in Anchorage. Trade and finance-insurance-real estate accounted for 1,500 of the increased employment. This was an unexpected response from the support sector, given the decreasing basic sector employment. Local government added significantly to this growth, expanding employment by about 2,000.

Two delayed adjustments took place in the post-pipeline period. The first was a response by the support sector to the larger economy. The full expansion of this sector may have been prevented during the pipeline period because of the high demand for labor and the rapid growth of the economy which may have created a delayed investment response. The second delayed adjustment was the spending of accumulated savings and capital gains. This spending lengthened impact of the pipeline beyond the period of direct employment impact.

The state economy has adjusted to the end of the pipeline. Future growth can be expected at much lower rates than in the past. Future growth will depend on the expansion of the basic sector and whatever structural change may occur.

One of the most important basic industries for the future will be mining. With the beginning of production at Prudhoe Bay, Alaska became the third largest oil producing state. Continued development at Prudhoe Bay and exploration in NPRA, as well as the OCS areas, will be responsible for the continued future growth of mining.

The 200 mile fisheries limit will increase the importance of the fishing industry. Alaska's current domestic catch accounts for only 7 percent of the fishery resource (Alaska Pacific Bank, 1979). The near future growth may be limited because of the investment required to move into bottomfishing.

In the near future, construction will be dependent on government projects. The next major project planned is the construction of the ALCAN natural gas pipeline in the early 1980's. If constructed, this project should have impacts similar to the TAPS project.

Table D-1 shows the Alaska State Division of Economic Enterprise near-term forecasts for Alaska. The post-pipeline decline in construction is being absorbed by growth in the mining, manufacturing services, and government sectors. As shown, the near-term forecast is for relatively slow growth.

2. Regional Economic Environment: The following describes the economic profiles of the areas directly affected by the proposed lease sale.\

a. Anchorage Region: Anchorage and its surrounding communities constitute Alaska's growth bowl. With nearly one-half the state's civilian resident population and nonagricultural employment, the Anchorage Census Division clearly sets the economic pace for the state.

Key elements of the expected Anchorage situation are a steady 4 percent employment growth in 1978, an increase in civilian resident population (to nearly 198,000 by mid-year 1980), and a slightly increasing unemployment rate as labor force increases exceed employment increases.

As table D-2 shows, Anchorage is the state's trade, petroleum, service, and finance center. Growth in these areas, as well as in government expenditure, real estate, and residential construction, has largely cushioned the Anchorage economy from the post-pipeline decline. Similarly, strong growth in employment is expected in the shortrun.

b. Southcentral Region: Anchorage, because of its link to the rest of the state through the support function, is indirectly affected by resource development; however, the remainder of the Gulf of Alaska region is directly affected by resource development. The southcentral region contains both the historically important and the new natural resource industries.

Fisheries of the southcentral region are some of the most important in the state, accounting for close to half the catch of the state's fishing industry.

The upper Cook Inlet region was the state's first major oil-producing region and contributed to the development of the petrochemical industry in Kenai. The oil port, built as the terminus of the Trans-Alaska Pipeline at Valdez, contributed to the economic growth of the southcentral

Table D-1
State of Alaska
Estimated Population, Labor Force, Employment, Personal Income

Population and Labor Force	Annual Average		Forecast	
	1976	1977	1978	1979
	Thousands			
Population (trended) 1/	402.5	407.0	404.5	410.0
Labor Force (CPS basis) 2/	168.0	174.0	163.7	165.2
Employment (CPS basis)	154.0	158.0	148.1	149.0
Unemployment (CPS basis)	14.0	16.0	15.6	16.2
Unemployment Rate (percent, CPS basis)	8.4	9.2	9.6	9.9
Nonagricultural Wage and Salary Employment 3/				
Mining	3,965	4,488	5,560	5,551
Contract Construction	30,233	19,546	12,175	11,872
Manufacturing	10,331	10,835	11,553	11,505
Logging and Sawmills	1,945	2,021	1,870	2,079
Paper and Pulp Products	1,198	1,248	1,173	1,150
Misc. Food/Kindred Products	4,717	5,058	5,868	5,671
Other Manufacturing	2,471	2,508	2,642	2,605
Transportation, Communication, and Public Utilities	15,704	16,027	16,631	17,164
Trucking	3,066	2,443	2,137	2,098
Water Transportation	1,331	1,794	1,276	1,372
Air Transportation	4,643	4,373	4,483	4,588
Other Transportation	1,858	2,140	3,340	3,586
Communications	3,484	3,707	3,957	4,015
Public Utilities	1,201	1,276	1,439	1,505
Wholesale Trade	6,098	5,900	5,747	5,730
Retail Trade	21,466	22,553	22,770	22,875
Finance, Insurance, and Real Estate	7,102	7,762	8,212	8,161
Services	27,633	27,423	27,191	27,494
Government	47,885	48,771	52,041	52,970
Federal	17,994	17,734	18,081	18,555
State	14,123	13,860	14,315	14,615
Local	15,818	17,177	19,645	19,801
Miscellaneous Employment	1,298	763	856	982
Total	171,714	164,068	162,744	164,303
	Billion Dollars			
State Petroleum Revenue 4/	.07	.06	.31	.45
Personal Income	4.10	4.30	4.50	5.00

1/ The forecast period is from 1978 to 1979.
2/ The forecast period is from 1978 to 1979.
3/ Employment on this basis is not comparable with employment on a civilian population survey basis above.
4/ Alaska Dept. of Revenue, Dec. 1978. Calculated for fiscal years, and excludes income and property taxes.

Source: The Alaskan Economic Information and Reporting System, Quarterly Report, Jan. 1979, Alaska Division of Economic Enterprise.

Table D-2
Anchorage Census Division
Forecasts of Economic Activity and Population to 1980[1/]

Item	1976	1977	1978	1979
		Number		
Total Nonagricultural Employment	73,733	77,858	80,960	84,393
Federal Government	9,813	10,059	10,154	10,256
State and Local Government	10,129	11,100	11,387	11,497
Mining	1,409	1,300	1,669	1,768
Contract Construction	7,587	7,795	6,747	7,176
Manufacturing	1,629	1,687	1,789	1,881
Transportation, Communication, and Public Utilities	7,409	8,085	9,447	9,594
Trade	15,958	16,576	15,853	17,240
Finance, Insurance, and Real Estate	4,257	4,748	5,104	5,520
Services	15,450	16,207	16,841	17,391
Other	94	300	302	303
Labor Force	73,436	84,514	94,755	102,614
Midyear Civilian Population	173,000	177,621	185,420	190,258
		Thousand Dollars		
Payroll	1,427,061	1,611,342	1,785,931	2,008,836
Personal Income	1,799,125	2,076,739	2,321,187	2,608,217
		Percent		
Unemployment Rate	6.9	6.5	7.1	7.4

1/ Forecast period is from 1978 to 1980, except for personal income and population for which historical data are available only through 1976. Figures are estimates.

Source: Alaska Economic Information and Reporting System Quarterly Report, Oct. 1978.

Table D-3
Growth of Employment, Population, and Personal Income
Southcentral Alaska

Year	Population	Employment	Personal Income
	Number		Million dollars
1965	30,235	7,124	90.1
1970	37,809	9,582	157.3
1971	39,227	10,127	165.1
1972	39,148	10,735	172.9
1973	39,716	12,131	210.2
1974	41,986	13,645	264.4
1975	51,923	18,300	414.0
1976	59,431	23,030	548.7
	Annual Average Percentage Increase		
1965-76	6.34	11.26	17.8
1970-76	7.83	15.74	23.15

Sources: State of Alaska Department of Labor, Research and Analysis Section, Population Estimates by Census Division.
Alaska Department of Labor, Statistical Quarterly, various years.
U.S. Department of Commerce, Bureau of Economic Analysis, July 1978.
U.S. Dept. of the Interior, BLM, Alaska OCS Office, Socioeconomic Studies Program, Tech. Rpt. 1.
Institute of Social and Economic Research, Univ. of Alaska.
Northern Gulf of Alaska Statewide and Regional Population and Economic Systems Impact Analysis, 1979.

Table D-4
Employment by Industry
Southcentral Alaska

Industry	Annual Average Percent Increase 1970-76	1973-75
Agriculture, Forestry, and Fishing	37.87	5.16
Mining	1.37	18.59
Contract Construction	85.19	131.70
Manufacturing	11.90	.55
Food	8.65	.20
Transportation, Communication, and Public Utilities	2.09	32.62
Transportation	34.50	49.33
Communications	19.69	2.86
Public Utilities	8.38	12.66
Trade	11.22	31.72
Wholesale	10.59	60.82
Retail	11.46	23.95
Finance, Insurance, and Real Estate	14.68	25.86
Services	16.72	21.56
Hotel	20.09	24.77
Personal	4.28	-1.01
Business	37.07	78.12
Medical	9.15	-6.89
Other	11.54	24.90
Government:		
Federal	-4.28	5.65
State and Local	7.50	6.33
Total	15.74	22.82

Source: Estimated from Alaska Department of Labor, Research and Analysis Section worksheets.
Alaska State Housing Authority, Alaska. Yakutat Comprehensive Development Plan, Anchorage, 1971.
Alaska Consultants, Inc., Anchorage, Alaska. Yakutat Comprehensive Development Plan, December 1976.
See table D-3.

region during construction and will contribute to the regional growth in the future.

The following examines the historical growth of the southcentral region.

The aggregate indicators of southcentral economic growth illustrate the importance of TAPS construction to the economy of this region as shown in table D-3. Between 1973 and 1976, the TAPS period, the population of the region increased by almost 20,000; employment, by more than 10,000; and personal income, by $330 million.

Population growth of 6.34 percent per year followed a pattern established by employment growth. Employment grew at an annual average rate of 11.26 percent during the 1965-76 period; in the post-1970 period, the rate increased to 15.7 percent. The employment growth rates are greater than the population growth rates. This reflects the type of employment growth in the region at this time. Employment connected with mining and construction is more transient than employment in other sectors and does not bring dependents to the area. This pattern also resulted from shift schedules which allow workers, particularly in mining, to live in other regions. The short-term enclave nature of the employment, such as construction of the TAPS line, was another reason for the decreased dependency ratio in the region.

Causes of Growth: The major cause of growth in the southcentral region was the expansion of the traditional basic industries. Table D-4 provides information on employment growth by industry.

The 3 major industries affecting the growth of southcentral Alaska are mining, construction, and fisheries. The growth rate of mining averaged 8.27 percent over the entire 1965-76 period. Mining experienced cyclical growth, declining after 1970 and rising again after 1973. The recent growth of the industry is a result of exploratory activity and increased petrochemical activity (Kenai Borough, 1977).

The major mining development occurred early in the period with the development of the Kenai-upper Cook Inlet fields. Petroleum activity in the Kenai fields can be described in 2 periods. Field development occurred between 1961 and 1968; this phase included the development of both onshore and offshore fields. During this phase, mining employment increased by more than 600 percent. Major construction of petrochemical plants and 7 pipelines were completed between 1961 and 1968. The second major phase was production. By 1970, all the major components of the petroleum industry had begun production (Math Sciences, 1976).

Construction employment increased at an annual average rate of 20.7 percent throughout the 1965-76 period. The major increase occurred between 1973 and 1975 when construction employment increased at an annual rate of 131.7 percent. This increase was a result of the construction of the Trans-Alaska Pipeline and the Valdez port facility. Construction activity in Valdez accounted for almost 70 percent of total regional employment in 1975 and 78 percent in 1976. Although this is not all TAPS-connected employment, it shows the magnitude of the effect of this project on the region.

Regional construction employment before 1970 was influenced mainly by petrochemical development in Kenai. Construction of 5 petrochemical facilities and 7 pipelines increased Kenai's construction employment to a peak of 1,209 in 1968 (Math Sciences, 1976). By 1970, regional construction employment had declined to 583.

The final basic industry in the southcentral region is the fisheries industry, which consists of fish harvesting and fish processing. Fish processing is a major component of manufacturing. The full impact of fisheries cannot be observed from employment data. Employment reported in nonagricultural wage and salary employment excludes self-employed, which is a major component of fishery employment.

Of course, employment may not be a good indicator of income because fisheries' incomes depend upon the catch and market value, as well as the number of fishermen. Independent estimates of fishery employment have been made based on catch and gear statistics. The totals for 3 regions--Prince William Sound, Cook Inlet, and southwest--are shown in table D-5.

Table D-6 summarizes the basic sectors in the southcentral region. The basic sector more than doubled between 1965 and 1976. The growth of the civilian basic sector replaced the lost military and Federal Government employment. Table D-7 illustrates the structure of the southcentral economy as defined by its employment distribution.

Personal Income: Personal income is an important economic indicator because it influences demand and growth of the support sector. It is also a measure of the growth of the residents' economic welfare. The effect of price increases (measured by the Anchorage CPI) and population increases on the real per capita income of residents is shown in table D-8 The real per capita income of the southcentral region increased at an overall average yearly rate of 5.42 percent; this is less than one-third the rate of increase of personal income. The most rapid growth in personal income occurred between 1973 and 1975, the period of peak TAPS construction.

The Subregions in the Southcentral Alaska Region: Southcentral Alaska is made up of a number of local economies. These economies differ in their size and economic structure. The economies range from the largest--Valdez--with a 1976 employment of 7,818, to the smallest--Yakutat--with employment in 1976 of 241. The economies not only differ in size but

Table D-5
Estimated Fish Harvesting Employment and Value

Year	Employment 1/	Catch 2/	Value 2/	
	Number	Mil. lbs.	----- Thousand Dollars ----	
1970	2,193	269.3	40,681	37,117
1971	2,052	256.6	36,658	32,469
1972	1,853	233.8	44,773	38,631
1973	2,235	362.6	73,498	60,841
1974	1,998	254.5	65,912	49,225
1975	2,031	256.8	60,971	40,033
1976	2,388	-----	------	------

1/Rogers and Listowski, 1978.

2/Alaska Department of Commerce and Economic Development, 1977. Value is deflated by the Anchorage CPI.

Source: See table D-3.

Table D-6
Basic Employment Sector Growth, Southcentral Alaska
1965, 1970, 1973, and 1976

Industry	1965	1970	1973	1976
	Number			
Agriculture, Forestry and Fisheries	19	99	491	680
Mining	345	762	640	827
Contract Construction	880	583	681	6,978
Manufacturing	1,188	1,647	2,627	3,234
Federal Government	975	828	602	637
Total Civilian Basic Employment	3,407	3,919	5,041	12,356
Total Military	2,651	2,110	1,039	991
Total Basic Employment	6,058	6,029	6,080	13,347

Sources: See table D-3.

Table D-7
Percentage of Total Employment by Industry

Industry	Percentage of Total
Agriculture, Forestry, and Fisheries	2.95
Mining	3.59
Contract Construction	30.30
Manufacturing	14.04
Food	9.24
Transportation, Communication, and Public Utilities	6.39
Transportation	4.24
Communication	1.07
Public Utilities	1.08
Trade	11.00
Wholesale	1.53
Retail	9.47
Finance, Insurance, and Real Estate	2.08
Services	11.28
Hotel	2.01
Personal	.16
Business	3.28
Medical	2.02
Other	3.81
Federal Government	2.77
State and Local Government	15.60

Source: See table D-3.

Table D-8
Growth of Real Per Capita Income
Southcentral Alaska

Year	Personal Income	Real Personal Income	Real Per Capita Personal Income
	Thousand dollars		Dollars
1965	90,128	95,677	3,164
1970	157,316	146,234	3,796
1975	414,045	271,861	5,236
1976	548,651	335,983	5,653
	Annual Average Percentage Increase		
1965-76	17.85	12.10	5.42
1970-76	23.15	14.87	6.86
1973-75	40.34	24.98	9.31

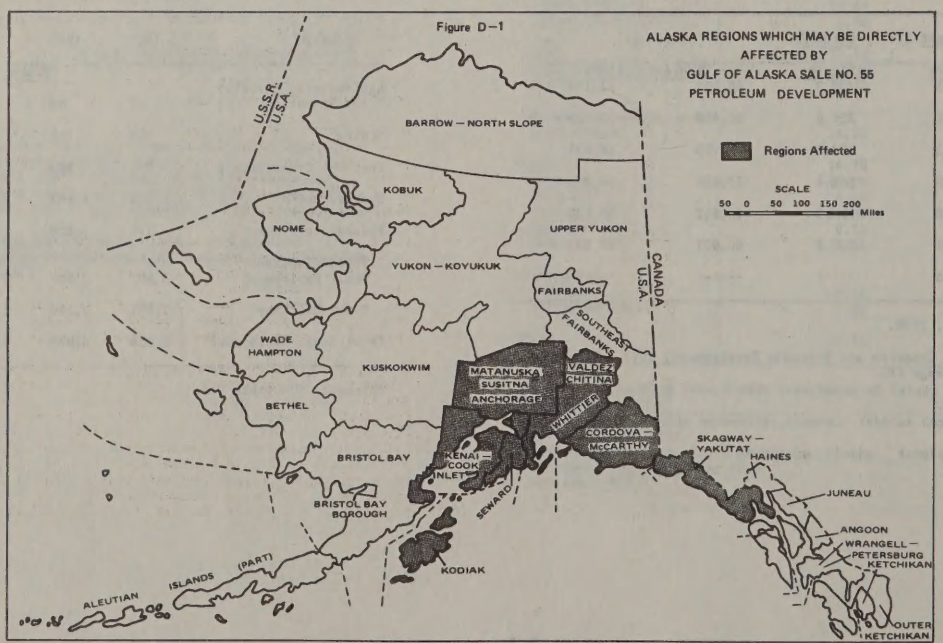
Sources: See table D-3.

Table D-9
Growth of Aggregate Indicators
Small Economies
1965, 1970, and 1976

Regions	Population			Employment			Personal Income		
	1965	1970	1976	1965	1970	1976	1965	1970	1976
	Number						Million Dollars		
Cordova-McCarthy	1,991	1,857	2,353	604	702	1,041	7.5	9.8	17.7
Valdez-Chitina-Whittier	2,396	3,098	13,000	452	831	7,818	6.1	9.7	163.0
Matanuska-Susitna	6,125	6,509	14,010	1,083	1,145	2,269	13.4	24.3	108.9
Seward	2,213	2,336	3,395	620	692	1,136	5.7	8.4	25.9
Kenai-Cook	8,446	14,250	16,753	1,753	3,576	6,465	26.7	57.2	156.0
Kodiak	9,064	9,409	9,366	2,310	2,469	4,153	30.6	45.0	72.9
Skagway-Yakutat	--	350	550	--	193	241	--	3.0	4.2

Source: See table D-3.

Figure D-1



Source: U.S. Department of Commerce, Bureau of the Census

also in the factors determining their growth. A question of some interest is whether the region can be treated as a single economy. This is important because southcentral is treated as a single economy in these projections. We will examine the small economies which make up southcentral in the following discussion, and show why it can appropriately be treated as a single region.

In Alaska, the spatial order of the economy is that all local economies have a position in a regional structure. The link through transportation and support services in Anchorage makes a large portion of Alaska a region centered on Anchorage. The aim in defining economic regions is to provide some spatial disaggregation of this major region. There are 2 approaches which have been taken to define regions. The first approach is based on the principle of functional integration. This notion would group economies which are interrelated and integrated. The second approach is based on the principle of homogeneity. This approach forms regions which are as much alike as possible yet different from other regions (Nourse, 1968).

The following will describe the local economies in terms of their size and growth since 1970. Although each census division is not an individual economy, the analysis must concentrate on census divisions because of data limitations. Table D-9 shows the employment, population, and personal income of each subregion in 1965, 1970, and 1976. Between 1965 and 1970, the major growth in the region was centered in Kenai with the petroleum development in Cook Inlet. Between 1965 and 1970, employment in Kenai grew at an annual average rate of 15.3 percent per year. Kenai increased its share of regional employment from 31.9 percent in 1965 to 36.6 percent in 1970.

After 1970, Valdez was the fastest growing region. Between 1970 and 1976, employment in Valdez increased over 8 times. The construction of TAPS was responsible for this growth. The fastest growing economy after Valdez was Matanuska-Susitna, which increased employment at a 12.1 percent rate. Kenai grew at an average annual rate of 10.4 percent after 1970. During this period, Kodiak and Seward also experienced rapid average annual growth rates of close to 9.0 percent. Employment also grew rapidly in Cordova at 6.8 percent per year, and in Yakutat at a lesser rate of 3.7 percent after 1970. Figure D-1 illustrates the regions which may be directly affected by the proposed petroleum development.

c. Seward: Since the late 1950's, Seward's economy, which has been traditionally based heavily in transportation activities, has been undergoing a period of adjustment and change. Anchorage and Whittier are currently the premier ports for southcentral Alaska. Seward now has a more diversified economy based primarily on fish and fish processing, tourism, wood products, and institutional activities. In the process of adjusting to this economic change, Seward's population declined through 1970, but recently experienced a significant amount of growth.

When converted to an average annual full-time basis, Seward was found to have a total of 1,015 jobs in 1978 (see table D-10). The largest single sector in terms of employment was government, followed by the trade, service, manufacturing and agriculture, forestry and fishing sectors, respectively. Employment in the remaining sectors accounted for only a relatively small proportion of Seward's jobs in 1978, except for mining which had no employees in the community.

A total of 354 average annual full-time jobs was identified in the government sector of Seward's economy in 1978. All 98 jobs in local government are considered as secondary. Close to three-quarters of state jobs counted in the community, however, were judged to be basic. The 2 largest state employers were the Alaska Department of Transportation and Public Facilities, Division of Marine Transportation and the Alaska Department of Education. All remaining basic state employment in Seward is connected with the University of Alaska's Institute of Marine Science.

Seward also has a significant amount of Federal Government employment, all of which was judged to be basic in 1978, except for that derived from the operation of the Post Office. The largest single Federal employer was the Forest Service with 32 full-time and 16 seasonal employees, plus persons enrolled in the Youth Conservation Corps and Young Adults Conservation Corps programs. However, the U.S. Coast Guard also employs 15 personnel in the Seward area performing search and rescue and port safety missions. The Army and Air Force recreation areas are staffed by a combined total of approximately 9 persons, and the Alaska Railroad has 6 local employees.

Trade was the second largest employment sector in Seward in 1978, although only around 40 percent of the jobs in this sector were judged to be basic. Essentially all of the basic jobs in this sector are tourist- or fisheries-related. Seward has a very large number of restaurants and bars for a town of its size, which derive a significant share of their business from transient tourists and fisheries traffic. Similarly, Seward has more boat and marine servicing businesses than would normally be warranted in a town of its size for the same reasons.

A total of 161 average annual full-time jobs in the service sectors was identified in Seward in 1978, with close to 40 percent being basic. Approximately one-quarter of these jobs were associated with the operation of the Wesleyan Nursing Home. The remaining basic jobs in this sector were primarily associated with hotel and motel operations serving transient visitors to the community.

On an average annual full-time basis, 100 jobs in fishing were identified in Seward in 1978. All of these jobs are considered basic. In addition, the manufacturing sector had a total of 121 average annual full-time employees in the community in 1978, all of whom were basic, except for those associated with publication of the local newspaper. The largest single employer in the manufacturing sector was Seward Fisheries, which had an annual average of 63 employees, but which had as many as 250 during the peak season (July/August). The other major employer was Kenai Lumber, with an annual average of 30 employees.

Table D-10

Average Annual Full-Time Employment

Seward, Alaska, 1978

Industry	Employment	
	Number	Percent
Agriculture, Forestry, and Fishing	100	9.8
Mining	0	---
Contract Construction	9	0.9
Manufacturing	121	11.9
Transportation, Communication, and Public Utilities	57	5.6
Trade	193	19.0
Finance, Insurance, and Real Estate	20	2.0
Service	161	15.9
Government		
Federal	104	10.2
State	152	15.0
Local	98	9.7
Total	1,015	100.0

Sources: Alaska Consultants, Inc., Aug. 1978.

See table D-3.

Transportation, communication, and public utilities accounted for an annual average of 57 jobs in Seward in 1978, with close to two-thirds of these jobs judged to be basic. Almost all of these basic jobs were held by stevedores associated with the unloading of Alaska Railroad barges and other vessels. A total of 29 jobs was counted in the finance, insurance, and real estate (20 jobs) and contract construction (9 jobs) sectors in Seward in 1978. However, all of these jobs were determined to be secondary.

Employment figures show that the economy of the Seward division was much healthier in 1976 than was the case in 1970. However, when the average annual full-time employment of the immediate Seward area in 1978 is compared with that of the Seward division for 1976, it can be seen that relatively little growth occurred in the large area during the past 2 years except in trade.

A recent survey of Kenai Peninsula Borough communities by the University of Alaska (1977) found the median family income in the Seward urban area to be $15,625 in 1975. This was the lowest found for any of the Kenai Peninsula towns surveyed, except Homer, and was well below the mean household income reported for the immediate Cordova area in 1974 by Alaska Consultants, Inc. (February 1976).

Public assistance program payments distributed by the Alaska Department of Health and Social Services is a significant source of income in some Seward households. The Bureau of Indian Affairs distributed a total of $16,061 to 12 individual cases in the Seward area in fiscal 1977. Since Seward has a small permanent Alaska Native population, it is assumed that at least some of these payments were made to Seward Skill Center students, of whom approximately one-half are Alaska Natives.

Fishing and Fish Processing Industries: The fishing and fish processing industry is a significant source of employment and income for many Seward residents. Before the 1964 earthquake, there were 3 seafood processing operations in this community. However, the 2 major processing plants were destroyed in the earthquake and only 1 was rebuilt. Today, the community has 1 major processor, Seward Fisheries, Inc., plus 2 smaller firms, Alaska Sea Products, Inc. and Anderson Seafoods. Approximately 80 persons were employed in fish processing on an average annual year-round basis in Seward in 1978, plus another 100 in fishing. Not all of these people, however, are local residents.

Although Seward is located within the Cook Inlet fisheries area, a major share of fish products landed and processed in this community come from other fisheries areas. For example, salmon processed by Seward Fisheries in 1978 came from the Prince William Sound, Kodiak, and Chignik fisheries areas, as well as Cook Inlet, while close to half of the herring processed at this same plant came from Prince William Sound. Thus, Seward's fisheries industry must be viewed in a much broader context than that of the Cook Inlet fisheries area.

Relatively few salmon are taken in the immediate Seward area, as the eastern district of the Cook Inlet fisheries area is not a major salmon producer. The district does have a commercially significant "even year" pink salmon run, which has yielded good catches since 1968 except in 1974. However, the "odd year" pink salmon runs remain minimal. For example, the 1978 commercial pink salmon catch for this district was 29,738 fish, compared with only 1,349 in 1977. According to Alaska Department of Fish and Game officials in Homer, the 25-year average for pinks caught in the eastern district is 12,892 fish. However, the average is depressed by the poor odd year runs, with even year catches since 1968 (except for 1974) ranging between 18,000 and 42,000 fish.

The outlook for salmon in the Cook Inlet fisheries area appears good. Alaska Department of Fish and Game officials in Homer report that salmon runs in the lower Cook Inlet area are building up, particularly in the outside district, and that a record catch may be taken here in 1979. In the immediate Resurrection Bay area, there are conflicts between commercial and sport fishermen, including competition for boat harbor berths. If the more serious of these conflicts can be resolved, Seward's convenience to adjacent commercial salmon fisheries areas such as Prince William Sound and Kodiak should continue to ensure Seward's importance as a salmon processing center.

Halibut is an important fisheries product in Seward. According to Seward Fisheries, the Seward plant froze about 1587 kgs (3.5 million lbs) of halibut in 1978. This is approximately the same as in 1977 when, according to the International Pacific Halibut Commission, 2002190.4 kgs (3,149,000 lbs) of halibut were landed at Seward.

Although Seward is a major halibut port, Alaska Department of Fish and Game officials interviewed in Kodiak expressed the belief that this fishery has little future potential, particularly if large-scale entry into bottomfishing is undertaken. In their opinion, a major bottomfish industry would probably place too much pressure on limited halibut stocks, and could result in the elimination of halibut as an independent commercial fishery. Even if such conflicts can be averted, however, the outlook for halibut, at best, offers only a very limited potential for growth.

The herring sac roe fishery is normally a significant element in Seward's fishing and fish processing industry. This is a highly seasonal fishery with most fishing effort concentrated between Arpil and June. Except for a minor amount taken in the eastern district in 1975, herring have not been taken in Resurrection Bay since 1974. According to Seward Fisheries, about half of the herring processed at Seward presently comes from other districts in the Cook Inlet fisheries area and the remainder from Prince William Sound.

Tanner crab is normally a commercially significant fishery in Seward. Seward Fisheries freezes crab in sections, although some is marketed fresh. According to Seward Fisheries personnel, their plant at Seward processed only about 226,799 kgs (500,000 lbs) during the first 4 months of 1978, and does not expect to process any more when the season opens again in December. Normally, this Seward plant processes 2-3 times the 1978 production level.

Despite the current lack of fishing effort, the outlook for tanner crab processing at Seward appears good, given the existence of nearby under-exploited tanner crab resources. The same is not true of king crab. In the past, king crab has been frozen in sections at the Seward Fisheries plant, with some marketed fresh. However, virtually no king crab was processed at Seward in 1978. Seward Fisheries reported that the 1978 season was poor. Crab was processed at the recently acquired plant on Homer Spit (formerly Alaska Seafoods), which is closer to the more productive Kamishak Bay and southern districts. In the opinion of the Alaska Department of Fish and Game's Homer office, this is likely to continue in the future.

Interest by Alaska processors in bottomfishing has accelerated following the U.S. declaration of a 3211.86 km (200 mi) offshore territorial limit. One of Seward Fisheries' parent companies, the New England Fish Company, is currently involved in a bottomfish venture out of Kodiak and its other parent firm, Icicle Brand Seafoods, has been active in bottomfish processing in the Petersburg area. Depending on the level of success of the Kodiak venture, the establishment of a bottomfish industry at Seward currently appears likely. Seward has a locational advantage in that it is convenient to both the Yakutat and Kodiak grounds. A disadvantage is its lack of a sizable resident fishing fleet.

Other Industry: As of September 1978, there was no activity in Seward associated with offshore oil and gas operations although the drilling rig, Ocean Ranger, was still stored in Resurrection Bay. However, Seward experienced a brief flurry of activity following the April 1976 Outer Continental Shelf Oil and Gas Lease Sale in the northern Gulf of Alaska and could conceivably experience similar or greater levels of activity following future offshore sales in this region.

As a result of the April 1976 offshore lease sale, Exxon, Gulf, and Texaco based their offshore service operations out of Seward, while Shell and ARCO, which used Yakutat as their primary base, were also represented at Seward. In addition, Sun Oil, which was involved in a stratigraphic test well drilling program on the Kodiak Shelf operated out of Seward for a few months during 1977. Together, these firms had 5 company representatives stationed in Seward during much of 1977. Other onshore jobs temporarily accruing to Seward as a result of offshore oil and gas exploration activities included those associated with Dresser Industries, which hired 6 or 7 local Seward residents in connection with its supply base operation, and 2 or 3 boat company representatives.

The peak of oil- and gas-related activity at Seward occurred during the summer of 1977 and, according to Texaco spokesmen, started falling off by September of that year. The final offshore well was spudded near the end of March 1978, and shortly thereafter, the last of the companies, which had based their operations in Seward, left the community.

Wood Products: The wood products industry has long been a factor in Seward's economy. Today, a mill operated by the Kenai Lumber Company (Louisiana Pacific being the parent company) is located near the Alaska Railroad dock and cuts both dimension lumber and cants, the latter for the Japanese market, and also produces chips, most of which are exported.

The mill at Seward is large by southcentral Alaska standards, producing between 12 and 15 million board feet of lumber/cants per year. Normally this mill closes during the winter months, but according to Kenai Lumber Company officials, a winter operation is planned this year. A total of 31 jobs are currently provided by the mill, 6 of them in management positions.

Most timber for the Kenai Lumber Company sawmill currently comes from the Prince William Sound area. Louisiana Pacific finished logging a sale on Latouche Island during the spring of 1978 and the company has also been getting timber from other locations in the Sound such as Montague Island. In addition, some timber has been obatined from the Cook Inlet area.

Tourism and Recreation: The Seward area offers a wide variety of outdoor recreation experiences which attract large numbers of visitors, most of them from the Anchorage metropolitan area, to the community during the summer months. This area has a spectacular natural setting and supports a wide variety of game animals, birds, and marine life. However, the primary attraction of Seward is the exceptional recreational boating opportunities available. Seward is within convenient driving distance of Anchorage and is also accessible by air. Air charter services are also available at Seward.

A major share of the basic jobs identified in the trade and service sectors of Seward's economy in 1978 were judged to be derived primarily from tourism. In addition, jobs associated with the operation of the M/V Tustumena can be considered tourist-related. A characteristic of tourist-derived jobs in Seward, as in most of Alaska, is that they are highly seasonal. After the recreational boating season has ended, visitors from the metropolitan Anchorage area travel elsewhere for entertainment. Jobs in Seward, which are dependent on this traffic, are lost until the following season.

Anchorage residents currently make heavy use of Seward, Whittier, and Homer for saltwater recreational boating activities. With the future growth of the Anchorage metropolitan area, recreation demands placed on all 3 towns should show a commensurate increase. Although Seward offers more limited boating opportunities than do the other 2 communities, it can be more conveniently reached and, unlike Whittier, is a city with a range of other urban amenities and attractions for visitors.

Seward's connection to the state marine highway system also attracts tourists to this community. Another important source of visitors to Seward is the U.S. Air Force and the Army, which maintain camps at the north end of town for military personnel and their guests.

Besides attracting recreational boaters, ferry passengers, and military personnel, Seward also attracts other visitors. The Chugach National Forest borders the community to the north and east and offers a range of outdoor attractions, including camping, hiking, hunting and fishing, and a share of these people visit Seward. In addition, special events, such as Seward's Silver Salmon Derby and the Mount Marathon Race, attract large numbers of people to the community for short periods.

Institutional Activities: Seward has 2 major institutional employers, the Wesleyan Nursing Home and the Seward Skill Center. Both institutions make significant contributions to Seward's economy in that they serve patients and students from outside the Seward area, and thus bring more money into the community.

City Finances: A review of the full value of property, as determined by the State Assessor (Alaska Taxable) within Seward's corporate limits and the Kenai Peninsula Borough boundaries from 1969 through 1977, was undertaken. According to the State Assessor's records, the full value of property in Seward increased by just under 200 percent during this period. Overall, increases in property valuation at Seward during the 1969 to 1977 period were slightly below those experienced by Homer (203.3 percent) and Soldotna (225.3 percent), but were well ahead of Kenai and Seldovia. By contrast, the Kenai Peninsula Borough, as a whole, experienced a much more substantial 370.4 percent increase in property valuation between 1969 and 1977, with by far the greatest proportion of this increase occurring in areas outside the various incorporated cities within the borough.

An analysis of Seward's general fund revenues and expenditures for the fiscal year ended June 30, 1977, was undertaken (see table D-11). A very high proportion of Seward's general fund revenues is derived from local sources. Total general fund revenues for fiscal 1977 amounted to $1,451,735. Of this, the greatest amount (34.9 percent of the total) was derived from property taxes, followed by miscellaneous local revenues (28.4 percent), intergovernmental revenues (23 percent), and harbor revenues (13.7 percent).

A share of intergovernmental revenues, such as business license and liquor license refunds, and raw fish taxes, can be said to be locally generated revenue. However, excluding these revenues, slightly over three-quarters of Seward's general fund revenues in fiscal 1977 were locally collected. After property taxes, the largest single source of local revenue was derived from the rental of boat slips in the small boat harbor, and the largest source of intergovernmental revenues was provided by Comprehensive Employment and Training Act (CETA) funds.

Although Seward's general government revenues are primarily derived from locally generated funds, this is not the case with education services provided by the Kenai Peninsula Borough. According to figures provided by the Alaska Department of Education, approximately 68 percent of total operating revenue sources for the borough school system in fiscal 1977 came from state sources, compared with about 30 percent from local (i.e. borough) revenues.

A review of Seward's overall financial condition indicates that the city's financial position is basically sound, but in order to maintain this position, Seward has had to resort to levying extremely high property taxes. According to the State Assessor's records (see table D-12), Seward's $12,361 per capita property valuation is below that of other Alaska cities of a similar size (for example, Cordova's was $13,735 and Petersburg's was $16,015 in 1977), and the local taxation burden, which provides a comparable range of local government services, is therefore greater.

In addition to the high local taxes paid by Seward residents, the community's current level of bonded indebtedness is such that it has only a limited capacity for additional assumption of general bonded debt. As of June 30, 1977, the city of Seward had an outstanding general obligation bonded indebtedness of $1,489,000, accounting for a per capita debt of $653, or 5.29 percent of total property valuation.

However, since Seward is within the Kenai Peninsula Borough and since property in the city is taxed by that areawide unit of local government, Seward is also indirectly responsible for a share of the borough's bonded indebtedness. Using a pro-rated share of the Kenai Peninsula Borough's general bonded debt, based on the city of Seward's accounting for 2.3 percent of the borough's 1977 full value determination, a $530,969 indirect debt has been added to the city's general bonded debt to arrive at a total debt of $2,019,969. This total debt figure translates into a per capita debt of $886, or 7.17 percent of total property valuation within the community, which is above the $795-average for Alaska cities in 1977, and significantly exceeds the guidelines used by Moody's Investor's Services.

Table D-11
General Fund
Statement of Revenues and Expenditures
City of Seward
Year Ended June 30, 1977

Expenditures	Actual Dollars
Council	60,830
Office Supplies	14,991
City Manager	86,870
City Engineer	43,775
Clerk/Treasurer	51,185
Finance	75,449
Police Department	321,964
Fire Department	49,326
Street Department	189,332
City Shop	45,969
Health, Education, and Welfare	18,985
General Services	78,841
Municipal Building	40,841
Boat Harbor	118,590
Debt Service	153,638
Insurance Reserve	
Youth Employment	979
Total Expenditures	1,351,128
Fund Balance, Beginning of Year	351,367
Prior Period Adjustments	(30,186)
	321,181
Revenues	1,451,735
	1,772,916
Expenditures	(1,351,128)
Fund Balance, End of Year	421,788

Source: Price Waterhouse and Co., August 1977.
City of Seward, Financial Statements and Supplementary Information, June 30, 1977. Anchorage.
See table D-3.

Table D-12
Indicators of Financial Condition [1]
City of Seward, 1977

Item	Financial Indicators
Population [2]	2,279
Full Value Determination	$28,170,267
Full Value Per Capita	$ 12,361
General Obligation Debt	$ 1,489,000
Total Debt [3]	$ 2,019,969
Per Capita Debt:	
General Obligation	$ 653
Total	$ 886
Debt as Percentage of Full Value	
General Obligation	5.29%
Total	7.17%
Guidelines for Per Capita Debt:	
Direct	$ 618
Overall	$ 733
Percentage of Full Value [4]	5.50%

1/ All fiscal data for Seward current as of 7/1/77.
2/ Population estimate as of 7/1/77 accepted by the Alaska Department of Community and Regional Affairs for municipal revenue sharing purposes.
3/ Total debt equals Seward's G.O. bonded debt plus a pro-rated share ($530,969) of the Kenai Peninsula Borough's G.O. bonded debt, based on the City of Seward's accounting for 2.3 percent of the borough's 1977 full value determination. Not included is $668,000 in city revenue bonds outstanding as of 7/1/77.
4/ Median value for selected places of under 10,000 population used by Moody's Investor Services, Inc.

Sources: Alaska Department of Community and Regional Affairs, Division of Local Government Assistance. Alaska Taxable: Municipal Property Assessments and Equalized Full Value Determinations. Juneau. (Annual Report.)
Price, Waterhouse & Company. June 30, 1977. City of Seward Financial Statements and Supplementary Information. Anchorage.
Alaska Consultants, Inc. September 1978. City of Yakutat Capital Improvements and Services Program. Anchorage.
See table D-3.

d. Cordova: Cordova's economy is dominated by the fishing and fish processing industry. In 1978, close to 50 percent of the 1,381 jobs (including basic and secondary jobs) calculated by Alaska Consultants, Inc. were in the fishing and fish processing sector. In 1978, 143 of the jobs were in the Federal Government, 122 in local government, and 81 in the state government. Following government, the trade sector accounted for about 11 percent of the remaining employment. Of the "all other" category, service and transportation, communication, and public utilities employment compose a majority of the category (see table D-13).

Unemployment and Seasonality of Employment: Like most Alaska communities with economy heavily based in fishing and fish processing, employment in the Cordova area shows a high degree of seasonal variation. In 1976 (the most recent year for complete data), the Cordova-McCarthy census division showed the highest degree of seasonality of all census divisions in Alaska.

Income: In 1974, the mean household income in the Cordova area was estimated at $22,500. This was well above the 1969 median family income of $12,053 for the Cordova-McCarthy census division by the 1970 census, even allowing for cost-of-living increases. More recent income data are available from the Alaska Department of Labor. The Cordova-McCarthy census division had a monthly average wage of $1,220 in 1976, compared with the State's $1,928. However, these statistics are distorted since the state average is reflective of the high wages by persons on the pipeline, and at the same time, the Cordova-McCarthy census division statistics exclude most fishing activities.

Sector Analysis: The fisheries industry of the Cordova area has become more of a year-round operation in recent years, particularly since the large-scale entry into tanner crab fishery; and this has had the effect of increasing fishing and fish processing employment in the community. Salmon remains the most important fishery, but the tanner crab has served to lessen Cordova's employment seasonality.

All 5 salmon species are taken and processed locally, as are salmon eggs, king crab, dungeness crab, tanner crab, herring, herring roe, herring roe on kelp, halibut, and razor clams. A minor amount of shrimp is also taken, but none is processed locally. Six major seafood processors and several smaller firms were active in Cordova in 1978; however, of the major processors, only 3 actually operated.

Pinks are the major salmon species caught in the Prince William Sound. The 1977 pink salmon catch reached 9,303,336 kgs (20 million lbs). This area also had a major chum salmon fishery which reached 2,356,452 kgs in 1977. With the advent of the San Juan hatchery, the first of 4 planned, a high increase in pink and chum salmon population of the Prince William Sound area is expected.

The Copper River/Bering River is predominantly a red salmon fishery with a 1977 catch of 2,849,968 kgs (6 million lbs); however, the coho salmon fishery is also significant with a catch of 841,881 kgs (1 million lbs).

A limited amount of halibut is delivered to Cordova fish processors. The 1978 quota for halibut in the primary fishing area was set at 989,000 kgs (11 million lbs).

The herring sac roe fishery, a limited entry fishery, preliminary 1977 catch was 2,260,379 kgs (2,491.6 tons) of which 2,071,228 kgs (2,283.1 tons) was herring sac roe and 189,151 kgs (208.5 tons) was herring eggs on kelp. Like the herring sac roe, herring eggs on kelp are primarily destined for the Japanese market.

Shellfish is an important part of Cordova's major economic activity, with tanner, dungeness, and king crab all being harvested in significant quantities. In addition, small amounts of razor clams are taken locally for bait. In the 1977-78 season, the tanner crab catch amounted to 2,446,650 lbs, the dungeness crab catch was 735,609 lbs, and the king crab catch was 86,595 lbs. The shrimp catch for the same season was 174,515 lbs and the razor clam harvest was 2,160 lbs.

Tourism and Recreation: Excepted for areas in the vicinity of Whittier, the Prince William Sound region has a largely undeveloped recreation potential. This is partially because Cordova is inaccessible by road and inconvenient to reach by ferry, although Cordova does have excellent air service.

A large proportion of tourists now visiting Cordova are sportspeople. The Copper River flats ranks as one of the best bird hunting areas in North America. Sport fishing and big game hunting are also popular with tourists.

The completion of the Copper River Highway would cause a fundamental change in tourism in the Cordova area. Another factor which would influence tourism in this area in the future is the proposed Wrangell-St. Elias National Park, the western boundaries of which extend to the Copper River.

Table D-13
Total Basic and Secondary Employment for Cordova, 1978

Industry Classification	Number Employed	Percentage of Total
Agriculture, Forestry, and Fishing 1/	400	29
Manufacturing 2/	277	20
Government	346	25.1
Trade	146	10.6
All Other	212	15.3
Total	1381	100.0

1/ Jobs in this classification are essentially fishing related.

2/ Jobs in the manufacturing classification are mainly in fish processing.

Source: See table D-3.

3. Impacts on the State and Regional Economy:

a. Impacts on State Employment: Using total no-sale case employment growth as a reference, table D-14 displays the employment impacts of the mean case northeastern gulf development. The overall average rate of employment growth increased from 2.1 to 2.4 percent per year between 1980 and 2000. Although overall employment expands by less than 1 percent in 2000, there are 1,854 additional statewide jobs. The highest employment impact occurs in 1989, the first year of production. Personal income impact is highest in 1988 (see table D-17).

Table D-15 provides an indication of the response of the economy to OCS development. The table measures the ratio of total change to OCS-induced change for employment and income in the state and 2 regions. We note from table D-15 that the ratio of the total change to the initial (direct) change in employment is 4.28 in 1989.

Table D-16 identifies trends in the distribution of base and development case employment by industrial sector: (1) the basic sector; (2) the support sector; and (3) the government sector. The northeastern gulf mean development apparently does not change the composition of employment over time.

b. Impacts on Personal Income: According to the MAP model projections in table D-17, the personal income impact of mean OCS development experiences a local maximum of $102 million nominal dollars in 1988. This is coincident with the peak real per capita personal income impact of $24, one-half percent rise from the real per capita personal income base of $4,392. Over the entire projection period (1980-2000), the rate of personal income growth rises modestly from 9.5 to 9.6 percent per year. The impact of OCS mean development has no significant effect on the cost of living over the projection period (see table D-18).

c. Impacts on the State Fiscal Position: OCS development in the northeastern gulf affects the state fiscal position in 2 ways. First, property tax receipts related to OCS development increases state revenues. Also, internal state revenues increase as a result of general economic expansion induced by OCS development. Secondly, state expenditures will increase to maintain or expand levels of pre-development public service. Revenue expansion from development leads to increases in the general fund balance which creates additional pressure to increase the level of state spending.

State Revenues: Table D-19 illustrates the effect of northeastern gulf development on general fund revenues in nominal and in 1978 dollars, assuming the petroleum facilities are subject to state taxation.

Table D-14
Total State Employment
Impact, Northeastern Gulf

Year	No Sale Case	Mean Development Case	Impact on Employment
		Thousands	
1980	196.419	196.419	0.
1985	226.479	226.838	0.359
1988	239.483	241.068	1.585
1989	245.985	247.868	1.884
1990	251.706	253.568	1.861
1991	255.905	257.711	1.806
1995	275.306	276.925	1.619
2000	311.329	313.184	1.854

Table D-15
Mean Development
Scenario Impacts, Northeastern Gulf

Impacts	Units	Statewide	Southcentral	Anchorage
Changes from Base Case:				
Initial Changes in Employment	Number	440	420	20
Total Changes in Employment	Number	1,884	782	704
Initial Changes in Real Personal Income	Mil. 1967 dollars	5.9	4.57	.638
Total Changes in Real Disposable Personal Income	Mil. 1967 dollars	17.49	8.141	5.508
Summary Impact Measure:				
Ratio of Total to Initial Employment Change		4.28	1.86	35.2
Ratio of Total to Initial Change in Real Income		3.4	1.78	8.833

Source: Institute of Socioeconomic Research, MAP Model.

Table D-16
Structure of the Economy
Northeastern Gulf, Mean Scenario

Industry	Proportion of Total Employment				
	1980	1985	1990	1995	2000
Support Sector:[1]					
No-Sale Case	34.5	38.3	40.8	44.0	47.1
Mean Scenario	34.5	38.3	40.9	44.0	47.2
Government:[2]					
No-Sale Case	41.2	37.8	34.7	31.9	28.6
Mean Scenario	41.2	37.7	34.6	31.8	28.5
Basic Sector:[3]					
No-Sale Case	24.3	24.0	24.4	24.1	24.3
Mean Scenario	24.3	24.0	24.5	24.2	24.3

1/ Support Sector includes transportation-communication-public utilities, trade, finance, and service employment.

2/ Government includes state, local, and Federal employment.

3/ Basic Sector includes mining, manufacturing, agriculture-forestry-fisheries, and construction employment.

Table D-17
Personal Income Impacts
Northeastern Gulf EIS
Mean Development--Moderate Base Scenario

Year	No Sale	Mean Development	Impact
	Millions of Nominal Dollars		
1980	4583.8	4583.8	0.
1985	7479.75	7494.95	15.199
1988	9856.01	9958.05	102.047
1989	19842.7	10941.4	98.605
1990	11823.4	11915.8	92.363
1991	12809.6	12907.6	98.09
1995	18104.6	18226.3	121.672
2000	28716.4	28915.3	198.84
	Real Per Capita Personal Income		
1980	3590.64	3590.62	-0.021
1985	4043.31	4046.18	2.868
1988	4392.16	4415.98	23.82
1989	4513.25	4415.98	14.816
1990	4606.34	4615.33	8.996
1991	4688.4	4696.51	8.113
1995	5130.81	5134.29	3.473
2000	5778.43	5780.77	2.344

Table D-18
Alaska Price Impacts
Northeastern Gulf Mean Development

Year	Alaska Relative Price Index (1967=100)		
	No-Sale Case	Mean Case	Impact
1980	313.268	313.268	0.
1985	399.161	399.151	-0.011
1988	463.377	463.214	-0.163
1989	485.89	485.586	-0.305
1990	509.518	509.144	-0.375
1991	534.668	534.306	-0.362
1995	650.14	649.886	-0.254
2000	827.732	827.48	-0.251

Table D-19
General Fund Revenue Impacts
Northeastern Gulf Mean Development

Year	No-Sale Case	Mean Development	Impact
	Millions of Nominal Dollars		
1980	1576.85	1576.85	0.
1985	3442.01	3443.54	1.528
1988	3954.71	3960.75	6.046
1989	4160.92	4181.23	20.313
1990	4219.59	4240.82	21.23
1991	4320.74	4342.27	21.523
1995	4908.5	4933.36	24.855
2000	5834.06	5866.77	32.703
	Millions of 1978 Dollars		
1980	1409.54	1409.54	0.
1985	2414.72	2415.86	1.137
1988	2389.92	2394.41	4.497
1989	2398.03	2411.25	13.219
1990	2319.07	2332.45	13.384
1991	2262.96	2275.77	12.812
1995	2114.19	2125.73	11.537
2000	1973.71	1985.38	11.667

As shown, real general fund revenue impacts decline by about 1.4 percent per year after peaking at $13.4 million in 1990.

Expenditures: Table D-20 shows the impact on state expenditures of northeastern gulf development. In order to maintain a constant level of real per capita services, nominal expenditure impacts increase from $3.7 million in 1985 to $55 million in 2000. Over this period, expenditure impacts grow continuously at an average annual rate of 20 percent. Nevertheless, expenditures are only .7 percent greater than base case levels in 2000.

Fund Balance: Under conditions of constant real per capita expenditures, the total funds balance is drawn down continuously. Table D-21 displays the impact pattern in nominal dollars and in 1978 dollars.

The sum of direct and indirect revenue impacts for the projection period is not sufficient to cover the additional public service requirements of development induced by economic growth. As a result, the impact on the funds balance is negative. The decline is small, however. For example, in 1995, the funds decline from $11,727 to $11,699, or about .2 percent.

d. Impacts on Regional Economy: Anchorage and southcentral are assumed to be the only regions directly affected by OCS development in the northeastern gulf. Anchorage is the center of headquarters employment, and the remaining field employment is located in southcentral. Generally, the process of regional economic growth is analogous to growth on the statewide level. However, the location of external employment, the size of the local economies, the distribution of state expenditures, and the extent of regional interaction are additional factors which distinguish statewide and regional growth.

Southcentral: Tables D-22 (southcentral employment) and D-23 (southcentral real disposable personal income) show the impacts of northeastern gulf OCS development in the southcentral region. The 1991 population and employment maximums are coincident with maximum resident direct field employment. During the 1980-1991 interval, OCS development increases the rate of employment and of real disposable personal income growth by approximately 10 percent.

Anchorage: Unlike the southcentral region, Anchorage employment grows steadily over the entire projection interval (see tables D-22 and D-23). From 1980 to 1989, OCS development increases the rate of employment growth by 2 percent. By 1995, the levels of Anchorage employment impact exceed those of southcentral, even though Anchorage direct employment (headquarters) is less than 9 percent of direct petroleum-related employment in southcentral. Relatively high petroleum sector wages are responsible for higher real disposable personal income impacts in the southcentral region.

Table D-20
Total State Expenditures
Northeastern Gulf Mean Development

Year	No-Sale Case	Mean Development	Impact
	Millions of Nominal Dollars		
1980	1626.58	1626.58	0.
1985	2751.69	2755.39	3.699
1990	4243.05	4267.85	24.801
1995	5804.55	5839.54	34.988
2000	8462.34	8517.54	55.199

Table D-21
Total Funds Balance Impact
Northeastern Gulf Mean Development

Year	No-Sale Case	Mean Development	Impact
	Millions of Nominal Dollars		
1980	1220.77	1220.77	-0.
1985	4919.7	4913.48	-6.227
1990	9963.03	9944.	-19.027
1995	11727.	11698.7	-28.227
2000	8156.94	8082.	-74.945
	Millions of 1978 Dollars		
1980	1091.24	1091.24	-0.
1985	3451.38	3447.11	-4.274
1990	5475.63	5469.2	-6.434
1995	5051.05	5040.87	-10.184
2000	2759.56	2735.04	-24.524

Table D-22
Regional Employment Impact
Northeastern Gulf Mean Development--Moderate Base Scenario

Year	No-Sale Case	Mean Development	Impact
	Southcentral Employment Thousands		
1980	24.942	24.942	0.
1985	28.089	28.206	0.117
1990	30.859	31.636	0.776
1995	32.877	33.496	0.619
2000	37.181	37.836	0.655
	Anchorage Employment Thousands		
1980	88.067	88.067	0.
1985	104.462	104.601	0.139
1990	118.498	119.183	0.686
1995	132.959	133.61	0.651
2000	252.655	153.435	0.779

Table D-23
Regional Income Impact
Northeastern Gulf Mean Development

Year	No-Sale Case	Mean Development	Impact
	Southcentral Real Disposable Personal Income Millions		
1980	147.442	147.442	0.
1985	180.423	181.571	1.148
1990	220.329	228.275	7.945
1995	255.15	262.742	7.592
2000	317.617	326.558	8.94
	Anchorage Real Disposable Personal Income Millions		
1980	555.861	555.861	0.
1985	714.558	715.631	1.073
1990	876.734	881.64	4.906
1995	1056.86	1161.96	5.015
2000	1310.83	1317.49	6.661

The summary measures in table D-15 illustrate the range of regional response to OCS petroleum development and emphasize the sensitivity of Alaska's internal sector (centered in Anchorage) in the overall growth process.

Impact results suggest that the Anchorage region is highly responsive to the indirect effects of OCS petroleum development in the northeastern gulf. Anchorage serves as a headquarters for petroleum and petroleum support firms, and more generally operates as an administrative, financial, and logistics center for the state. Development-induced income and employment growth in southcentral are, therefore, important determinants of demand for goods and services in Anchorage. Anchorage support sector expansion will generate additional local income, raise wage rates, and attract migrants from other regions and from outside Alaska. Additional population growth will increase demand for state services, and further increase Anchorage's share of state spending.

4. Impacts of the Minimum and Maximum Northeastern Gulf Scenarios: To account for uncertainty in OCS development, maximum and minimum scenarios are examined in comparison with the no-sale case. With few exceptions, the composition of development impact is the same. The major difference between impacts consists of magnitude. Tables D-24 through D-27 display impact results in terms of employment, state expenditures, and fund balance.

a. Employment: The employment impact in the year 2000 in the minimum scenario is about 60 percent of the maximum scenario impact. The ratio of minimum to maximum scenario direct employment in 2000 is also about 60 percent.

b. Expenditures: In both the maximum and minimum scenarios, state expenditures exhibit the same pattern as the moderate base case. By 2000, nominal expenditures in the maximum case are $71.3 billion greater than in the base case. This compares to a $43.8-million difference between the minimum development and the base case scenarios.

c. Fund Balance: In all 3 development scenarios, the funds balance experiences a negative impact relative to the no-sale case. However, the character of funds impact is quite different in each case. By the end of the projection period, the minimum scenario reduces the funds balance by about $170 million. This is 2.3 times the mean scenario impact and 2.7 times the maximum scenario impact.

d. Impact of LNG: As shown, the LNG plant in the maximum case adds to employment, state expenditures, and to the rundown of the fund.

5. Cumulative Impacts of Northeastern Gulf OCS Development: The following examines the sensitivity of cumulative impacts to the no-sale case. Two additional scenarios are presented. The first combines the maximum northeastern gulf and the high base case scenarios for a "cumulative" high case. Similarly, the minimum northeastern gulf and low base cases are combined to create a "cumulative" low scenario.

The high and low cumulative impacts are closely matched with the maximum and minimum scenario impacts taken in the context of the no-sale case (tables D-24 through D-27). Consequently, the magnitude and character of impacts appear to be independent of the base case. For example, low case population impacts in 2000 differ by less than 1 percent. Similarly, the employment impact differential is equal to 3 employees during peak minimum case direct employment in 1990. High case population and employment impact differentials are slightly greater in 2000, 5 percent and .2 percent, respectively.

Variables describing the fiscal position of the state also show extremely close impacts. In 2000, the fund impact in the cumulative high case is 6 percent greater than the maximum OCS scenario-moderate base case impact. Expenditure impacts in the cumulative low scenario are consistently less than those of the mean scenario. However, the pattern of expenditure impacts is similar. When external employment peaks in 1991, the cumulative low case is $5.6 million less than that of the base case. By 2000, this case fund balance is $20 million lower than the mean case balance.

Little local economic impact is expected in Seward and Cordova because of their great distance from the proposed lease area. However, because of the service facilities available in Seward harbor, it may be used for some activities. In any case, the Seward-Cordova impacts would involve minor increases in employment and impacts because of their great distance from the proposed lease area.

6. Alternative II - Impacts of No-Sale Case:

a. Causes of Economic Growth in Alaska: The following no-sale case economic forecast for the state and the regions is taken from the Institute of Socioeconomic Research, "The Growth of the Alaskan Economy without the Proposal," Technical Memo No. 1, BLM/Alaska OCS, 1979.

For the purposes of this study, economic growth may be defined as employment, population, and income expansion. An important source of economic growth in Alaska is resource development in the petroleum sector. Petroleum development is assumed to accrue externally since it is determined largely by external demand for Alaska petroleum products. Additionally, activity in this sector is, by definition (i.e., external), not affected by general economic activity that is internal to Alaska.

Table D-24
Total Employment Impact
Northeastern Gulf Minimum Development

Year	No-Sale Case	Minimum Development	Impact
		Thousands	
1980	196.419	196.419	0.
1985	226.479	226.8	0.321
1990	251.706	253.075	1.368
1995	275.306	276.607	1.301
2000	311.329	312.816	1.487

Table D-25
Expenditure and Fund Balance Impact
Northeastern Gulf Minimum Development

Year	No-Sale Case	Minimum Development	Impact
		Total State Expenditures Millions of Nominal Dollars	
1980	1626.58	1626.58	0.
1985	2751.69	2754.94	3.252
1990	4243.05	4262.	18.957
1995	5804.55	5832.43	27.871
2000	8462.34	8506.17	43.832
		Total Fund Balances Millions of Nominal Dollars	
1980	1220.77	1220.77	-0.
1985	4919.7	4915.49	-4.215
1990	9963.03	9943.66	-19.363
1995	11727.	11657.9	-69.125
2000	8156.94	7987.36	-169.578

Table D-26
Total Employment Impact
Northeastern Gulf Maximum Development

Year	No-Sale Case	Maximum Case	Impact	Additional LNG Impact[1/]
		Thousands		
1980	196.419	196.419	0.	
1985	226.479	226.844	0.366	
1990	251.706	254.	2.294	.467
1995	275.306	277.471	2.165	-.014
2000	311.329	313.836	2.506	.151

1/ This additional LNG impact is calculated for a mean case LNG impact and underestimates the maximum LNG impact.

Table D-27
Expenditure and Fund Balance Impact
Northeastern Gulf Maximum Development

Year	No-Sale Case	Maximum Case	Impact	Additional LNG Impact[1/]
		Total State Expenditures Millions of Nominal Dollars		
1980	1626.58	1626.58	0.	
1985	2751.69	2755.67	3.985	
1990	4243.05	4272.64	29.593	7.900
1995	5804.55	5848.74	44.187	6.800
2000	8462.34	8533.68	71.336	7.100
		Total Fund Balances Millions of Nominal Dollars		
1980	1220.77	1220.77	-0.	
1985	4919.7	4914.21	-5.496	
1990	9963.03	9959.85	-3.176	-.630
1995	11727.	11717.9	-9.094	-42.805
2000	8156.94	8092.96	-63.98	-106.367

1/ This additional impact is calculated for a mean case LNG impact and underestimates the maximum LNG impact.

External resource development affects growth directly and indirectly. Employment requirements associated with petroleum development provide the principal example of a direct effect. Employment and income expansion in this sector will influence the growth of the economy through increased demand for goods and services produced in Alaska. The determination of employment in the internal sectors (i.e., sectors for which activity affects and is affected by growth) depends on labor requirements needed to produce a desired level of internal sector output.

In the MAP model, the demand for output is a function of real disposable personal income. Output demand is highly responsive to income (i.e., income elastic), so that increase in personal income lead to proportionately greater increases in output (the accelerator effect). Thus, employment and aggregate income expansion increase output demand and employment. Nevertheless, incremental additions to income are reduced by income leakages outside the economy or into savings, so that over time, the economy converges on a new equilibrium level of income, employment, and output.

Petroleum development has a number of important indirect effects on economic growth through the public sector. For example, state tax revenues from the petroleum sector will influence state spending behavior by changing the availability of public funds. With the flow of revenues from Prudhoe Bay oil and gas, Alaska will begin to accumulate a surplus in its general fund. This surplus, unlike the surplus in the permanent fund, can be used for state government expenditures. In the MAP model, this fund balance is assumed to have a positive supply effect on expenditures, causing them to be increased as funds accumulate in the balance. The effect of increases in the general fund balance on spending is assumed to depend upon the relative amount in the fund. A given increase in the fund balance will have a larger effect; the larger is the existing balance relative to existing expenditures.

State capital and operating expenditures provide another direct source of economic growth. Growing state capital expenditures on projects such as highways increase the output of the construction industry. This increases the demand for construction employment which, in turn, contributes to employment, income, and population expansion in other "support" sectors which are internal to the economy (e.g., trade, services, finance, transportation, communication, and public utilities). State operating expenditures are a principal determinant of state government employment. Increases in this category of public spending are responsible for direct expansion of aggregate employment and income.

In addition to the positive supply effects associated with increasing revenues, the level of state spending has been shown (Scott, 1978) to be responsive to changes in aggregate income (i.e., income elastic).

Growth in income will generate increasing demand for government services. Aggregate income expands with increases in the average income per worker and with increases in the number of workers in the economy. The average income is determined by wages and salaries, so it reflects changes in the wage rate. The real wage rate is determined by changes in prices, bottlenecks in the economy associated with rapid growth, and changes in outside wages. The U.S. labor market affects the Alaskan real wage rate because of the small size of the Alaskan labor market and the mobility of Alaskan workers. Because of these factors, migration becomes the equilibrating factor in the relation between wages in Alaska and the United States. Changes in the sectoral composition of employment will also affect the average wage. As high wage sectors (i.e., construction and mining) increase in importance, wages and salaries will increase more than proportionally to employment growth.

As the economy grows, its structure is subject to change. Larger economies generally have fewer income leakages and, therefore, a larger income multiplier, which may accelerate the growth process. Economies of scale may reduce production costs and stimulate import substitution in certain sectors.

Under conditions of abrupt or excessive growth, certain regions or sectors of the economy may be susceptible to bottlenecks and to binding supply constraints, which may increase the rate of inflation.

Population grows as a result of natural increase and of migration. Natural increase (the excess of births over deaths) is, in part, a function of the age distinction of the population. Migration patterns will influence the age-sex distribution and, therefore, the rate of natural increase. Migration is determined largely by the relative economic opportunities available in Alaska. Changes in employment opportunities and the relative per capita income between Alaska and the rest of the United States have a primary effect on the less-than-40-age cohort. Migration for those in excess of 40 years of age is responsive to other factors such as retirement and the high cost of living (Seiver, 1975).

Economic growth does not occur uniformly in Alaska. The uneven distribution of the statewide natural resource endowment is, in part, responsible for variation in the size and composition of regional economic activity.

A number of factors related to regional interdependence affects the relative growth of regions. First, government spending works to distribute growth between the regions. Increases in state revenues which result from growth in one region will be translated into growth in other regions through the distribution of state expenditures. State expenditures are distributed to a region in relation to its population. However, government centers such as Anchorage and Juneau receive a greater-than-proportionate share of state expenditures because of their administrative

and headquarter functions. Second, changes in industry-specific wage rates will affect the distribution of employment opportunities and, therefore, interregional migration. Third, regions which serve as regional centers will reflect growth in other regions, since they provide goods and services to other regions. The growth of Anchorage which serves as the financial, distributional, and administrative center of the state is the most obvious example of this, although smaller centers such as Fairbanks and Nome also experience this type of relation.

b. State No-Sale Case Economic Projections: In the following no-sale case, the 1980's and early 1990's present a period of extensive petroleum development activity. To a certain extent, this activity coincides with the proposed development activity in the northern gulf scenarios. Table D-28 summarizes the timing and magnitude of principal sources of petroleum development in the no-sale case.

Table D-29 displays the projected levels of aggregate indicators of growth (i.e., population, employment, personal income, and state expenditures). The average annual percentage rate of growth is presented in parentheses below each series. As shown, population is projected to grow at 1.8 percent per annum, employment at 2.1 percent per annum, while state expenditure and personal income are projected to grow at 9.0-9.5 percent or better than the assumed 5.5 percent influction.

Table D-30 illustrates the changing structure of the Alaskan economy. This table shows the distribution of employment between 3 sectors of the Alaskan economy: The support or service sector which includes transportation-communications-utilities, trade, finance, and service employment; the government sector; and the basic sector which includes mining, manufacturing, agriculture-forestry-fisheries, and construction. Separation of the basic and support sectors is not perfect. The support sector includes certain basic elements such as pipeline transportation, and the basic sector includes certain support sector construction employment. Note the local maximum in total employment in 1983, during peak ALCAN construction (not shown).

The overall trend in these sectors follows that of the historical period. The support sector expands its share of employment from about 35 percent in 1980 to 47 percent by 2000. This growth is comparable with the employment distribution in other states and results primarily from the increase in the scale of the economy, which allows lower costs and the expansion of this sector through import substitution. The share of the government sector falls from about 41 percent in 1980 to 27 percent in 2000. Federal Government employment is constant over the forecast period. The growth of state and local government cannot keep pace with the growth in the remainder of the economy. With the exception of a slight increase during ALCAN construction, the share of the nongovernment basic sector stays relatively constant throughout the projection period.

Table D-28
Characteristics of No-Sale Petroleum Development

Activity	Peak Interval and Peak Year	Nature of Development	Magnitude of Activity
ALCAN Gas Line[1/]	1981-1984 (1983)	Construction	4663 direct employment
Prudhoe Bay[2/]			
Oil	1980-1988 (1985)	Over 500 M Bbls/yr.	641.5 M Bbls/yr.
Gas	1984-2000 (1987-2000)	Start up when ALCAN completed	912 BCF/yr.
OCS[2/]			
Beaufort Sea	1988-1994 (1989)	Over 500 direct annual employees	1082 direct employment
Lower Cook Inlet	1980-1985 (1981)	Over 500 direct annual employees	912 direct employment

[1/] Northwest Energy Company manpower estimate, July 17, 1978.
[2/] Alaska OCS Socioeconomic Studies Program.

Table D-29
Growth in Aggregate Indicators
Northeastern Gulf, No-Sale Case

Year	Population	Employment	Personal Income	State Expenditures
	thousands		millions	
1979	403.256	193.51	4128.61	1371.84
1980	407.511	196.419	4583.8	1626.58
1985	463.443	226.479	7479.75	2751.69
1990	503.767	251.706	11823.4	4243.05
1995	542.747	275.306	18104.6	5804.55
2000	600.386	311.329	28716.4	8462.34
Annual Rate of Growth	1.8%	2.1%	9.5%	9.0%

Table D-30
Employment Growth and Structural Change,
Northeastern Gulf, No Sale Case

Year	(1) Total Employment	(2) Support Service Type Employment	(2)/(1)	(3) Government Employment	(3)/(1)	(4) Basic or Primary Secondary Employment	(4)/(1)
	thousands						
1980	196.419	67.735	0.345	80.899	0.412	47.785	0.243
1985	226.479	86.722	0.383	85.499	0.378	54.258	0.24
1990	251.706	102.787	0.408	87.444	0.347	61.475	0.244
1995	275.306	121.009	0.44	87.912	0.319	66.385	0.241
2000	311.329	146.723	0.471	88.912	0.286	75.694	0.243

(1) = total employment (thousands)
(2) = employment in transportation-communication-utilities, trade, finance, and service
(3) = employment in Federal, state, and local government
(4) = employment in manufacturing, agriculture-forestry-fisheries, construction

The combined effects of OCS (Lower Cook and Beaufort), Prudhoe Bay, and ALCAN development boost employment growth to an average annual rate exceeding 2.5 percent between 1980 and 1990. For the duration of projection, the rate of employment growth drops to about 2.1 percent.

Personal Income: Various categories of personal income projections are displayed in table D-31, together with the projected series of Alaska relative prices. The ratio of disposable personal income to personal income gradually declines from 84-80 percent over the forecast period. This implies an increasing tax burden.

During the ALCAN construction (1981 to 1984), personal income grows at an average annual rate of 11 percent. Prices grow at an average annual rate of 4.8 percent during this period, which is less than the overall 5.1 percent rate of inflation. High wage ALCAN construction employment is a logical source of rapid nominal income growth in the early 1980's. After peak ALCAN employment in 1983, real per capita disposable personal income declines by 6 percent, or $221. An absolute decline in purchasing power continues through 1985 during peak Prudhoe oil production. Generally, there are no distinguishing patterns to price and income growth in connection with phases of Prudhoe Bay and OCS petroleum development.

The State Fiscal Position: State spending is a direct source of economic growth. Increasing revenues from petroleum development and from other sources add to the state's feasible budget and strengthen the state's general fiscal position.

Revenues: Table D-32 shows the growth of selected categories of state government revenues between 1978 and 2000. Total general fund revenues grow at a rate of 7.9 percent per year. General fund revenues total internal revenues, petroleum revenues, plus general fund interest revenue, and Federal-to-state revenue transfers. Prior to 1990, the annual rate of general fund revenues growth averages 12.9 percent. This slows to 3.3 percent for the duration of the forecast. This pattern of revenue growth follows the pattern of petroleum revenues received by the state.

Petroleum revenues include royalties and bonuses, production taxes, property taxes, and corporate income taxes from petroleum production. From 1980 to 1989, petroleum revenues grow at 11.0 percent per annum. Pronounced production in both Prudhoe Bay and the Beaufort Sea is largely responsible for nearly a threefold increase in petroleum revenues (from $1 billion in 1980 to $2.6 billion in 1989). The subsequent decrease in petroleum revenue reflects declining production at Prudhoe Bay.

A decline in internal revenues from 1978 to 1980 is brought about by a general decline in population and income growth and, more importantly, by the introduction of a $100 income tax credit (see Alaska Statute 43.20.015) in fiscal year 1978, which grows to $300 per resident in 1980. The major components of internal tax revenues include personal income taxes, business license taxes, and corporate income taxes, net of the petroleum sector. These revenue components are sensitive to growth in population, personal income, and prices, all of which sustain positive growth over the forecast period.

State Expenditures: State government expenditures are of 2 basic types, operating expenditures and capital expenditures. Both of these increase during the projection period. The increase is a result of 2 forces. First, expenditures grow as a response to the general growth of the economy. Increased population results in increased expenditures to provide the same level of services, while the growth of income results in an expansion of the services provided. Second, the accumulation of unspent revenues is assumed to induce additional state expenditures.

Nominal state expenditures grow at 9 percent per year between 1978 and 2000 (see table D-33). This average annual rate of growth exceeds that of total state revenues by about 14 percent. During the period of pronounced petroleum development prior to 1990, expenditures grow at 10.7 percent. After 1989, when petroleum revenues peak, nominal expenditure growth falls to 7.1 percent per year.

State expenditures experience a real per capita increase of approximately 50 percent over the forecast period. If real per capita expenditures remain constant, then aggregate, nominal expenditure increases are controlling for growth in population and in prices. Any increase in real per capita expenditures may be interpreted as an increase in the level of public service.

Balances: The huge increases in revenues which result from the production of oil and gas place the State of Alaska in a unique position. The excess revenues available allow the state to build up its fund balance. These interest earnings increase yearly revenues. There are 2 types of fund balances--the permanent and the general fund.

The permanent fund is a legislated savings account for the state. In 1976, Alaska adopted a constitutional amendment which established the permanent fund. The relevant section of the constitution is Article IX, Section 15, which reads:

> ALASKA PERMANENT FUND. At least twenty-five percent of all mineral lease rentals, royalties, royalty sale proceeds, Federal mineral revenue sharing payments, and bonuses received by the State shall be placed in a permanent fund, the principal of which shall be used only for those income producing investments specifically designated by law as eligible for permanent fund investments. All income from the permanent fund shall be deposited in the general fund unless otherwise provided by law.

Table D-31
Income and Price Growth
Northeastern Gulf, No-Sale Case

Year	Personal Income [1]	Real Per Capita Personal Income [2]	Disposable Personal Income [1]	Real Per Capita Personal Income [2]	Relative Price Index
	Million Dollars	Dollars	Million Dollars	Dollars	
1979	4128.61	3447.68	3457.28	2886.84	296.964
1980	4583.8	3590.64	3845.15	3011.97	313.268
1985	7479.75	4043.31	6192.73	3347.72	399.161
1990	11823.4	4606.34	9675.68	3769.51	509.518
1995	18104.6	5130.81	14665.1	4155.98	650.14
2000	28716.4	5778.43	23014.3	4631.18	827.732

[1] Nominal dollars
[2] Deflated dollars

Table D-32
State Revenues
Northeastern Gulf, No-Sale Case
(nominal dollars)

Year	General Fund Revenues	Total Petroleum State Revenues	Internal Revenues
	Million Nominal Dollars		
1979	1431.12	860.7	281.455
1980	1576.85	996.3	268.669
1985	3442.01	2422.22	492.087
1990	4219.59	2459.19	827.116
1995	4908.5	2373.6	1404.77
2000	5834.06	2371.88	2462.86

Table D-33
State Expenditures
Northeastern Gulf, No-Sale Case

Year	Nominal State Expenditures (millions)	Real Per Capita State Expenditures
1979	1371.84	1145.56
1985	2751.69	1487.49
1990	4243.05	1653.06
1995	5804.55	1644.99
2000	8462.34	1702.82

Table D-34
State Fund Balance
Northeastern Gulf, No-Sale Case

Year	General and Permanent Fund	General and Permanent Fund [1]	General and Permanent Fund Interest
		Millions	
1979	1001.88	944.745	49.656
1980	1220.77	1091.24	70.926
1985	4919.7	3451.38	265.168
1990	9963.03	5475.63	655.201
1995	11727.	5051.05	837.011
2000	8156.94	2759.56	683.962

[1] 1978 Constant Dollars

Table D-35
Indicators of State Fiscal Position
Northeastern Gulf, No-Sale Case
Lower Cook Inlet Plus Beaufort Sea Moderate Scenario

Year	State Expenditure Personal Income Ratio	Internal Revenues Personal Income Ratio	Petroleum Revenue to General Fund Ratio	Net Fund Revenues Minus Expenditures (millions)
1980	0.355	0.059	0.632	218.886
1985	0.368	0.066	0.704	1199.74
1990	0.359	0.07	0.583	760.057
1995	0.321	0.078	0.484	15.566
2000	0.295	0.086	0.407	-1280.73

This establishes the permanent fund as a minimum amount of petroleum revenues which cannot be spent. The general fund includes the remainder of the state's unspent revenues and can be drawn on for state expenditures.

Table D-34 shows the total change in the fund balances over the period. The fund balance includes the state's unspent revenues. At its peak in 1995, the fund has $11.7 billion. At this time, the fund generates $837.0 million in interest per year. Note that in 1978 dollars, the fund balance (FUND78) reaches a maximum 4 years earlier in 1991. The decline in petroleum revenues after 1989 reduces the rate of increase in the fund. Between 1995 and 2000, the fund is reduced by $3.6 billion, or 30 percent. The cyclical nature of petroleum revenues and their importance as a part of state revenues suggests that expenditure policies which are tied to revenues are subject to similar cyclical patterns. In order to stabilize spending and maintain a constant level of public service, the state may be forced to draw down on its fund balance.

The variables in table D-35 illustrate the state's fiscal position. Net revenues in table D-35 is the difference between general fund revenues and general fund expenditures. It reaches a maximum in 1985 when Prudhoe oil production peaks. Thereafter, it declines at an increasing rate. By 1996, annual general fund expenditures exceed general fund revenues. This trend continues to deepen for the duration of the forecast.

Additional indicators of the state's fiscal position are the ratios of state expenditures to personal income, of internal revenues to personal income, and of petroleum revenues to total general fund revenues in table D-35. Overall, they imply a trend of less dependence on petroleum development for state revenues and, instead, indicate a shift toward internal sources of tax revenues. This shift away from petroleum-related revenues may be partly responsible for a decline in the ratio of nominal state expenditures to nominal personal income.

c. Regional Economic No-Sale Projections:

Southcentral Region (excluding Anchorage): Table D-36 displays employment and real disposable personal income growth in the southcentral region. Table D-37 provides an employment breakdown by various categories of basic (government and production for export) and nonbasic (support) sectors. Overall, employment grows at an average annual rate of 2.1 percent, about 7 percent less than state employment growth. Population grows at 1.4 percent, or about 22 percent less than state population growth from 1978 to 2000.

Two factors account for this trend. First, new employment has a lower dependency ratio than the traditional southcentral employment base. Second, rapid growth in other areas of Alaska encourage emigration by unemployed southcentral residents.

Major development projects in the southcentral vicinity include lower Cook OCS development and the Pacific LNG plant construction. These projects contribute to early employment growth of 3.3 percent between 1978 and 1982. Thereafter, employment grows at 1.8 percent per year.

From table D-37, we note that the basic sectors (mining, manufacturing, fishing, etc.) account for about 25 percent of southcentral employment and that this distribution is fairly stable over most of the forecast interval.

Anchorage Region: In table D-38, overall Anchorage employment grows at 2.5 percent per year. Since this growth rate exceeds those of the entire state, it appears that population and economic activity will continue to concentrate in Anchorage. The percentage of statewide population in Anchorage remains at about 47-48 percent over the forecast period.

As an administrative, financial, and logistics center for the state, Anchorage is less dependent on the proximity of resource development as a catalyst for growth than other regions of Alaska. In table D-39 basic sector employment amounts to about 5 percent of total Anchorage employment in 2000. Support sector activity absorbs over 70 percent of Anchorage employment in 2000, up from 57 percent in 1980. Nevertheless, Anchorage employment growth still depends on the extent and pattern of statewide basic sector development. For example, the rate of Anchorage employment growth drops over 50 percent between the 5-year intervals preceding and following peak ALCAN direct construction employment in 1983.

The external sector is influenced significantly by 3 events: The construction of the Pacific LNG plant between 1980 and 1983, the development of the lower Cook OCS, and the shutdown of the upper Cook oil fields in 1990. Two aggregate indicators--employment and disposable real income--are shown in table D-40.

Employment falls slightly in 1983 and 1991 after the Pacific LNG plant completion and the Cook Inlet closing, respectively. Employment grows at an average rate of 2.6 percent per year. The ratio of population to employment was much higher in 1978 in southcentral (2.58) than in the state (2.27). The southcentral ratio falls toward the state ratio by 2000 (2.21 for southcentral and 2.16 for the state).

Disposable real income grows throughout the period after falling with the completion of the Trans-Alaska Pipeline; in 1978 it is almost 20 percent lower than in 1977. Between 1978 and 2000, disposable real income increases at an annual average rate of 4.8 percent.

Southcentral Economic Structure: Table D-41 shows the changes in the structure of the southcentral economy during the projection period as described by changes in the distribution of employment. Two important

Table D-36
Growth in Select Aggregate Indicators--Southcentral Region
Northeastern Gulf, No-Sale Case

Year	Employment	Real Disposable Personal Income
	(thousands)	(million dollars)
1979	23.761	131.684
1980	24.942	147.442
1985	28.089	180.423
1990	30.859	220.329
1995	32.877	255.15
2000	37.181	317.617

Table D-37
Employment Share by Major Industrial Sector--Southcentral Region
Northeastern Gulf, No-Sale Case

Year	Mining and Exogenous Construction	Transportation Communication Utilities Endogenous Construction	Trade Services Finance	Manufacturing Agriculture Fishing Forestry	Government
	Thousands				
1978	0.775	3.298	8.808	4.313	6.603
1980	1.731	3.452	8.626	4.706	6.449
1985	1.241	4.076	10.216	5.556	7.06
1990	1.229	4.451	11.464	6.5	7.333
2000	0.779	5.275	15.128	8.659	7.663

Table D-38
Growth in Selected Aggregate Indicators--Anchorage Region
Northeastern Gulf, No-Sale Case

Year	Employment (thousands)	Real Disposable Personal Income (millions 1978 $)
1979	86.656	530.214
1980	88.067	555.861
1985	104.462	714.558
1990	118.498	876.734
1995	132.959	1056.86
2000	152.655	1310.83

Table D-39
Employment Share by Major Industry--Anchorage Region
Northeastern Gulf, No-Sale Case

Year	Mining and External Construction	Transportation Communication Utilities Internal	Trade Service	Manufacturing Agriculture Forestry Fishing	Government
	Thousands				
1978	1.33	12.816	37.811	2.08	34.979
1980	1.366	13.052	36.714	2.367	34.563
1985	1.408	16.512	47.406	3.172	36.062
1990	1.44	19.078	56.818	4.108	36.66
2000	1.43	25.201	81.786	6.522	36.901

Table D-40

Aggregate Indicators of Economic Growth, No-Sale Case, Southcentral

Year	Employment	Real Disposable Personal Income
	Number	Millions of Constant Dollars
1979	21,946	159
1980	23,745	184
1985	26,323	219
1990	30,054	277
1995	32,810	330
2000	36,886	407

Source: Institute of Social and Economic Research, University of Alaska, Eastern Gulf of Alaska Statewide and Regional Population and Economic Systes Impacts Analysis, MAP Model, 1979.

Table D-41

Economic Structure, No-Sale Case

Southcentral, Alaska

Year	Support Sector I [1]	Support Sector II [2]	Government [3]	Basic Sector [4]
	Percent of Total			
1978	38.6	14.7	22.4	24.4
1980	38.2	14.7	20.2	26.9
1985	39.2	15.0	20.2	25.5
1990	40.3	15.0	19.4	25.3
1995	41.9	14.9	18.6	24.6
2000	43.2	14.9	17.1	24.8

1/ Support Sector I includes trade, services, and finance-insurance-real estate employment.

2/ Support Sector II includes transportation, communication, public utilities, and other construction employment.

3/ Government includes state, local, and Federal employment.

4/ Basic Sector includes manufacturing, agriculture, forestry, fisheries, mining, and external construction employment.

Source: Institute of Social and Economic Research, University of Alaska, Eastern Gulf of Alaska Statewide and Regional Population and Economic Systems Impacts Analysis, MAP Model, 1979.

trends can be observed from this table. First, those external sectors which have recently been important to the region's growth--construction and mining--decrease their importance throughout the projection period. After completion of TAPS, this external construction decreases, then increases to a peak of 2,578 in 1982 with construction of the Pacific LNG plant and development of the lower Cook OCS. The second trend is the increasing importance of the support sector in the regions. Trade, services, and finance-insurance-real estate increase their share of total employment from 38.9 percent in 1978 to 44.6 percent in 2000.

d. Local Economic No-Sale Projections: The following local economy forecasts for no-sale conditions are taken from BLM Socio-economic Studies Program Draft Report, Eastern Gulf of Alaska, Local Socioeconomic and Physical Systems Impact Analysis, Alaska Consultants, Inc. The method employed to forecast future employment and population was the economic base method. This method divides all local economic activities into 2 categories: exporting or basic industries which bring money into the locality by exporting locally produced goods and services; and nonexporting or service industries which produce goods and services for local consumption. First, current employment is tabulated by economic sector and grouped as basic or service employment. Next, the recent trends and future prospects for each basic economic sector are analyzed and future levels of basic employment are forecast for each year. Finally, suitable ratios or multipliers relating basic employment to service or indirect employment are applied to basic employment projections to yield overall employment forecasts by sector. The suitable ratios vary from locality to locality, depending upon specific features of the local economy.

The local revenue and expenditure forecasts require some special qualifications for their proper use and understanding. The fiscal forecasts simply carry forward into the future the local revenue patterns and expenditure practices that prevailed before the forecast period, adjusted for population growth (as determined by the economic base analysis) and for inflation at an annual rate of 6 percent. In terms of purchasing power, local property tax revenues were kept at a constant per capita level, except for the addition of revenue from new OCS-related industrial property which is taxed at the prevailing local rate, subject to the limits of state law.

The general fund and school district expenditure forecasts assume that each local governing unit will maintain its present level, variety, and quality of services at its present per capita costs. On the whole, this is a debated assumption, though it is not easy to pinpoint when and where exceptions to it may occur. Finally, the forecast of funds surplus to operating expenditures and availability for capital improvements, debt service, or other purposes, is obtained by subtracting expenditures from revenues.

Cordova Under the No-Sale Case: Cordova is forecast to experience limited growth in the no-sale case.

Significant Factors Affecting Growth: At present, the fishing and manufacturing (mainly, fish processing) industries, together with government, serve as the mainstay of Cordova's economy. These 3 economic sectors currently provide almost three-fourths of all employment in the area. The employment forecast assumes that these sectors will continue to be the dominant sources of employment, but will grow at a slower rate than the economy as a whole. Still, about half of the new jobs through 2000 are projected to arise in these sectors.

An improved salmon fishery is suggested by initial success of Prince William Sound Aquaculture Corporation's hatchery and State of Alaska's program to develop additional hatcheries, as well as newly adopted limitations of foreign salmon fishing operations within the 200 mile limit. Additionally, modest growth in tanner and dungeness crab fishing, clamming and other minor fisheries is presumed.

The economic situation of fisheries and the fish processing industry at Cordova will presumably benefit from improved fisheries management programs. Better scientific understanding and further management experience will contribute to a more dependable high-level harvest of the region's diverse fishery resources. This will foster more efficient use of capital equipment and labor and should enhance the economic return to fishermen and the fish processing industry.

The fastest growth rates in Cordova's economy are assumed to occur in the trade and service sectors. This growth stems in part from a continuing gradual shift toward a more service oriented economy, with an increasing diverse array of commercial services and trade being provided locally. Growth in trade and services will also be supported by an assumed increase in outdoor recreation and tourism partly related to Cordova's role as gateway to a newly established Wrangell-St. Elias National Park and completion of the Copper River Highway.

In the governmental sector, only routine growth is expected, with 2 notable exceptions. First, construction of a U.S. Coast Guard helicopter air station at Cordova, now scheduled for completion in the early 1980's will add about 50 Coast Guard employees to Cordova's economic base. Second, it is assumed that part of the staff for management of the Wrangell-St. Elias National Park will be stationed at Cordova.

The remaining economic sectors (transportation, communications, and public utilities; finance, insurance, and real estate; contract construction; and mining) compose an essential but relatively small part, less than 10 percent, of local employment. The forecast is for these activities to maintain a constant small share of Cordova's employment.

Future Employment: As shown in table D-42, the no-sale case employment forecast for the Cordova area anticipates an increase of about 780 jobs, or 56 percent over the 1978 level of 1,381 jobs to 2,161 by 2000. This is equivalent to an annual growth rate of about 2 percent over the forecast period--a somewhat slower growth rate than is attributed to Yakutat or Seward. New employment is spread fairly evenly over the economic sectors of trade, services, fishing, and government, with each sector accounting for about 150 jobs, or taken together, about 80 percent of all employment increase.

Economic Impacts: The premises of the no-sale case do not imply any major shifts in the economic or social structure of Cordova. The community should be able to absorb projected growth without any exceptional growth stresses. Most important to the character of the community, the current dominance of the fishing and fish processing industries is assumed to endure under the no-sale case. Expected completion of the Copper River Highway will provide overland access to Cordova; establishment of the proposed Wrangell-St. Elias National Park will increase the volume of short-term visitors to the Cordova area. Still, the fishing and fish processing industry is assumed to endure as the mainstay of the local economy and the central feature of the town's social character.

Local Government Finances: The general fund revenue profile for the city of Cordova shows that the city obtains about 25 percent of its revenue from property taxes, 13 percent from sales taxes, and 27 percent from other local sources. Better than a third (36 percent) of its revenue is in the form of intergovernmental transfers. The city's revenues are expected to grow sixfold during the forecast period, assuming that the revenue framework continues without major changes. Discounted for inflation at 6 percent annually, this represents an effective increase of about 55 percent in revenues.

Cordova makes a relatively large local contribution to the cost of operating the local school district. About 11 percent of school district revenues are locally raised with almost all the rest coming from the state.

In fiscal 1977/78, Cordova's general fund operating expenditures amounted to $560 per capita or a total of about $1,261,000. The forecast envisions city operating expenditures growing to $7,112,000 by 2000.

As shown in table D-43 a comparison of Cordova's revenue and expenditure forecasts under the no-sale case indicates that the city has a small margin of surplus revenues, less than 6 percent, that can be used for debt service or capital improvements. In view of the pressing need for additional water supply and storage capacity, as well as other capital facility needs, it appears that Cordova may find it difficult to maintain its present services and its revenue structure intact if it is to meet the capital program requirements of the next few years.

A number of factors are seen to contribute to Cordova's growth over the forecast: some expansion and diversification in the fisheries and related industries; construction of new Coast Guard facilities; scheduled completion of the Copper River Highway making Cordova the gateway to the proposed Wrangell-St. Elias National Park. Cumulatively, these additions to Cordova's economic base should help the settlement support further limited growth.

Seward Under No-Sale Case: Seward is forecast to experience moderate growth in the no-sale case.

Significant Factors Affecting Growth: Under the no-sale case, the Seward area is forecast to exhibit steady economic growth stimulated primarily by expansion in 2 sectors of Seward's economic base. The first is long-term growth in the Seward-based fisheries, particularly bottomfishing, and related manufacturing activities in fish processing; and second, steady growth in basic employment in trade and services, reflecting expansion in tourism and recreational industries serving the Anchorage area and other non-local residents.

Optimism about the long-term prospects for the fisheries and fish processing industries is based on Seward's advantageous competitive position as a base for entry into and successful economic exploitation of the deep-sea fishery's resources of the Gulf of Alaska. Seward is within convenient range of both the Yakutat and Kodiak fishing grounds. Seward, unlike other coastal communities in the region, possesses waterborne transportation facilities which can readily accommodate comparatively large quantities of processed bottomfish. Bottomfish processing relies upon a relatively unskilled work force which Seward can partly provide with easy access to the larger labor market in the Anchorage area. Last, major fish processors with plants in Seward have experience in processing Alaska bottomfish and have expressed interest in expanding operations in this area.

In contrast to the prospects of the deep-sea fishery, the traditional fishery and fish processing industry in Seward is expected to decline slightly. The commercial catch will be limited by increased competition from sport fishermen, as the Anchorage area population increases. Also, buildup of the bottomfishery and bottomfish processing capacity will lead at times to production conflicts disruptive to the traditional commercial fishing industry.

The contribution of tourism and recreation to Seward's economic base is presumed to grow in step with the following trends and new factors: the proposed establishment of the Kenai Fiords National Park, which will complement the existing commercial boating facilities, outdoor recreational opportunities, and the marine highway system. Anchorage area population growth will generate rising demand for recreational and tourist facilities throughout southcentral Alaska. Seward will share in meeting these demands and will also share in the general increase in additional tourism and recreational business attracted to Alaska in years to come.

Table D-42
Forecast of Employment
Cordova Area No Sale Case

Industry	1979	1980	1985	1990	1995	2000
	Number					
Commodity Producing Industries	721	722	777	841	907	979
Agriculture, Forestry, and Fisheries	(406)	(412)	(443)	(478)	(514)	(554)
Mining	(2)	(2)	(3)	(4)	(6)	(8)
Manufacturing	(281)	(285)	(306)	(331)	(356)	(383)
Contract Construction	(32)	(23)	(25)	(28)	(31)	(34)
Distributive Industries	345	355	407	468	567	693
Transportation, Communications and Public Utilities	(73)	(74)	(79)	(84)	(89)	(94)
Trade	(150)	(155)	(180)	(209)	(254)	(309)
Finance, Insurance, and Real Estate	(34)	(34)	(36)	(39)	(42)	(46)
Service	(88)	(92)	(112)	(136)	(182)	(244)
Government	356	359	420	440	462	489
Total Employment	1,422	1,436	1,604	1,749	1,936	2,161

Source: Alaska Consultants, Inc. Draft Eastern Gulf of Alaska Local Socioeconomic and Physical Systems Impact Analysis, Final Technical Report, Alaska OCS Socioeconomic Studies Program, 1979.

Table D-43
Forecast of Revenues and Operating Expenditures, No-Sale Case
City of Cordova

Item	1979	1980	1985	1990	1995	2000
	Thousand Dollars					
General Fund Revenues:						
Property Tax	$ 415	$ 445	$ 665	$ 970	$1,437	$2,146
Other Revenues	1,243	1,331	1,989	2,902	4,298	6,419
Total	1,658	1,776	2,654	3,872	5,735	8,565
Operating Expenditures:						
City Operations	1,376	1,474	2,203	3,213	4,761	7,112
School Support	224	239	358	522	773	1,111
Total	1,600	1,713	2,561	3,735	5,534	8,223
Available for Capital Improvements:	58	63	93	137	201	342

Source: Alaska Consultants, Inc. Draft Eastern Gulf of Alaska Local Socioeconomic and Physical Systems Impact Analysis, Final Technical Report, Alaska OCS Socioeconomic Studies Program, 1979.

Table D-44
Forecast of Employment
Seward Area No-Sale Case

Industry	1979	1980	1985	1990	1995	2000
	Number					
Commodity Producing Industries	247	254	387	559	591	623
Agriculture, Foresty, and Fisheries	(101)	(102)	(152)	(204)	(224)	(234)
Mining	(3)	(3)	(4)	(5)	(7)	(9)
Manufacturing	(121)	(121)	(200)	(304)	(319)	(334)
Contract Construction	(22)	(28)	(31)	(46)	(41)	(46)
Distributive Industries	493	498	559	647	834	1,070
Transportation, Communications, and Public Utilities	(64)	(65)	(75)	(85)	(100)	(115)
Trade	(232)	(234)	(260)	(302)	(386)	(491)
Finance, Insurance, and Real Estate	(21)	(21)	(25)	(29)	(37)	(47)
Service:	(176)	(178)	(199)	(231)	(311)	(417)
Government	396	404	446	492	543	600
Total Employment	1,136	1,156	1,392	1,698	1,968	2,293

Source: Alaska Consultants, Inc. Draft Eastern Gulf of Alaska Local Socioeconomic and Physical Systems Impact Analysis, Final Technical Report, Alaska OCS Socioeconomic Studies Program, 1979.

Table D-45
Forecast of Revenues and Operating
Expenditures, No-Sale Case
City of Seward

Item	1979	1980	1985	1990	1995	2000
	Thousand Dollars					
General Fund Revenues						
Property Tax	$ 571	$ 616	$ 943	$1,405	$2,095	$3,266
Other Revenues	1,068	1,152	1,764	2,626	3,917	6,106
Total	1,639	1,768	2,707	4,031	6,012	9,372
Operating Expenditures:						
City Operations	1,525	1,646	2,519	3,751	5,594	8,722
School Support 1/	548	591	904	1,348	2,009	3,014
Total 1/	2,073	2,237	3,423	5,099	7,603	11,746
Available for Capital Improvements 1/	114	122	188	280	418	650

1/ The city of Seward does not make any direct expenditures for school support. The Kenai Peninsula Borough funds and operates a borough-wide school system. The figure for school support represents Seward's projected pro-rata share of the Kenai Peninsula Borough's school expenditures, but is not actually to be included in the city's budget.

Source: Alaska Consultants, Inc. Draft Eastern Gulf of Alaska Local Socioeconomic and Physical Systems Impact Analysis, Final Technical Report, Alaska OCS Socioeconomic Studies Program, 1979.

As a consequence, employment in the trade and service sector of Seward's economy is expected to assume increasing importance, especially in the second half of the forecast period. This growth would be consistent with other expectations about Seward's economy under no-sale case conditions. Expansion in tourism and recreational industries should be reflected heavily in additional jobs in the trade and service sector.

Over future years, the pattern of Seward's economy should exhibit increasingly the basic shift to a more service oriented economy that has long characterized the nation's economy. As Seward's economy matures and the range of commercial and business services that are locally provided diversifies, the service and trade component of the local economy will become steadily larger.

The other categories of employment, transportation, communications, public utilities, and contract construction are presumed to maintain a fairly constant proportion of overall employment. Government will remain a major employer; however, while government employment is projected to grow, its rate of growth will be outpaced by expansion in the private sector. Finally, forestry and mining industries, which presently account for a minor amount of Seward's economy, will probably continue as small-scale employers.

Future Employment: Overall employment in the Seward census division is estimated to grow by 105 percent during the forecast period--from 1,117 jobs in 1978 to 2,293 jobs in 2000. The bulk of this employment increase, perhaps 80 percent, will occur in the Seward vicinity.

As shown in table D-44, employment in the categories of agriculture, forestry, and fishing (mainly fishing) and manufacturing (mainly fish processing) is expected to grow by over 150 percent from 221 jobs in 1978 to 568 jobs in 2000. Job growth will also be strong in the sectors of trade and services which together are forecast to grow by 125 percent from 404 jobs in 1978 to an estimated 908 by 2000. Government--the most important single employment sector--is projected to grow more slowly than the economy as a whole, shrinking from about one-third to one-quarter of the total work force.

Local Government Finances: There are 2 features that distinguish the city of Seward's fiscal situation from that of Yakutat and Cordova. First, Seward does not levy a municipal sales tax. Second, the city is not directly responsible for supporting and operating a local school district, a function which is administered by the Kenai Peninsula Borough.

Property taxes (35 percent) and a miscellaneous array (42 percent) of fees and other income account for the locally raised share of Seward's general fund revenues. Intergovernmental transfers from state and Federal governments contribute the remaining 23 percent. Seward, unlike most Alaskan municipalities, does not assess a local sales tax and has no revenue from that source.

Over the period of the forecast, general fund revenues are estimated to increase by more than 6 times, from about $1,539,000 in fiscal year 1977/78 to about $9,372,000 in 2000 (table D-45).

Since the Kenai Peninsula Borough School District operates the Seward area elementary and secondary school systems, Seward's actual budget does not show revenue or expenditures for that function. However, an estimate was made of the cost to the borough of providing educational services to the Seward area. Based on Seward's proportionate share of school district enrollment, an equal share of the Borough School District's locally raised revenues was allocated to the Seward area. By this method, it was estimated that Seward's local share of revenues and expenditures for the school district was about $485,000 in fiscal year 1977/78, and would rise thereafter at the same rate as other expenses and revenues. In actuality, because the borough's industrial property tax base is concentrated in the North Kenai-Nikiski area, Seward's contribution to school district revenues through the borough-wide property tax assessment is likely to be less than estimated.

A relatively small proportion (about 7 percent) of Seward's projected revenues are in excess of general fund expenditures and available for additional debt service, capital improvements, or other purposes. Furthermore, Seward has a relatively high ratio (5.3 percent) of general obligation bonded indebtedness to assessed valuation. The debt ratio rises to about 7.2 percent if Seward's pro-rated share of the Kenai Peninsula Borough's debt is included.

Seward is facing a number of major capital projects for water, sewer, and power utilities in the near future, at a time when its debt ratio is higher than average and its per capita valuation below the statewide average. This suggests that Seward may face fiscal difficulties in meeting future capital facility needs within its existing fiscal framework, even under the no sale case. Unless the city is able to finance new facilities, largely with state and Federal grant funds, it may find it fiscally necessary to defer some projects or to develop additional non-property tax revenue sources such as a sales tax.

The no-sale case forecast anticipates an improvement in Seward's fortunes, based on expansion in diverse economic sectors. The fisheries and fish processing industry are predicted to thrive. Tourism and recreational industries are expected to grow and to engender a healthier trade and services sector. The prospects are for a doubling in employment by 2000. This upturn should be accompanied by an improvement in the city's fiscal circumstances and offers an opportunity to continue a long-term program to upgrade basic public utilities and services.

APPENDIX E

ESTIMATION OF DIRECT EMPLOYMENT AND DESCRIPTION OF BASIC ASSUMPTIONS UTILIZED

This section summarizes the estimated direct employment anticipated to result from the alternatives, including the proposal, as described in sec. I. These summary tables are included at the beginning of this section for reference purposes (tables E-1 through E-7). The development assumptions are summarized in sec. I, Alternatives Including Proposed Action; anticipated activities resulting from potential oil and gas development are described in sec. III.A.1., Basic Assumptions Regarding Causes of Possible Impact Resulting from the Alternatives Including the Proposal; and are discussed further in this section in terms of activities which generate employment. The reader is advised to consult these pages for a thorough understanding of the estimates, employment, and population effects.

Exploration Activity: After issuance of leases and required permits, exploratory drilling will be initiated. The exclusive use of semi-submersible drilling rigs is assumed; however, the use of other types of drilling units such as drill ships and jack-ups is possible. It is judged, however, that environmental conditions such as water depth (limiting the use of jack-ups) and the length and severity of storms (limiting the use of jack-ups and drill ships) would restrict their widespread use. Notwithstanding the economic and population effects of exploration, activity would not differ substantially assuming a reasonable mix of all 3 mobile drilling units, thus, semi-submersibles are used as the basis of analysis.

It is anticipated that exploratory activity would utilize existing supply/support facilities at Yakutat, Cape Yakataga and/or Seward. Docks, open storage yards, cranes, warehouses, mud tanks, water, fuel, and loading conduits exist at Yakutat and Seward. Cape Yakataga facilities include a gravel airstrip (IFR) and aviation fuel storage. (See Dames & Moore, August 1978, p. 18, for a detailed description of these facilities and their use in supporting previous Gulf of Alaska exploratory activity.) It is not expected that these facilities would be duplicated elsewhere as a result of exploratory activity.

In conducting an exploratory program, the operator typically performs supervisory and administrative functions, contracting with oil field service firms to perform the major drilling and logistic functions. These functions include drilling, mud engineering, well logging, completion services, diving, any predrilling biological or other surveys, and supply (vessels, aircraft, and shore based facilities). Operator personnel are typically composed of managers, operations superintendents, geologists, engineers, material expediters, and administrative support staff. These functions are detailed in the following paragraphs and are based upon previous drilling activity in the Northern Gulf of Alaska.

Table E-8 shows a typical drilling contractor complement for a semi-submersible.

Based upon previous Gulf of Alaska experience, drilling contractor crews would work the same number of days on as off. ODECO used a 28-day rotation scedule with half the shipboard employees changing every 7 days. SEDCO used a 21-day rotation schedule. The rotation factor would be 2, thus total employment would be 68.

Supply/support vessels used for exploratory activity would be similar to those used as a result of sale 39, i.e., supply vessels in the 200 ft class with 6,000-7,000 plus horsepower. Many would have anchor handling capability. (See Dames & Moore, August 1978, pp. 11-13, for a detailed description of these supply vessels and cargo capabilities.) Table E-9 shows a typical supply vessel crew complement. Each vessel is assumed to employ a crew of 13 on duty 24 hours per day, working 40 days on and 20 days off. Total employment per vessel would then be 20. Two supply vessels are assumed to serve each active rig; 1 of these vessels would always be in the vicinity of the rig in case emergency evacuation was required. Four would work the day shift, 2 the night shift, and 1 would accomplish miscellaneous tasks. Assuming employees worked 28 days on and 14 days off, total catering services employment would be 11 (Dames & Moore, August 1978, pp. 36-37, from A.R.A. Services, Inc.).

Crew changes and light cargo transfer from ship-to-shore are assumed to be made via helicopter of a type similar in capability to the Sikorsky S-61's employed in previous Gulf of Alaska drilling. It is assumed 1 helicopter would be needed per rig, plus a common backup. For example, if only 1 rig were active, 2 helicopters would be required; if 2 rigs were active, 3 helicopters would be required and the backup helicopter would remain available in case of emergency.

Based on gulf experience, 2 pilots are required in flight and 3 mechanics are required per machine. Crews would work 14 days on and 14 days off, thus each active rig would employ a total of 10 (Dames & Moore, August 1978, p. 38., from ERA Helicopters).

Shore bases serve as storage and transfer points for offshore operations. Heavy goods such as casing and drill pipe, water, fuel, muds and chemicals are stored and transferred to supply vessels for delivery offshore. Typical facilities include helipads, runways, open and covered storage, mud, water and fuel storage, docks, and perhaps, minor repair facilities.

The shore base at Yakutat employed 22-26 local residents and 4-6 operator personnel during previous exploration activities in the Gulf of Alaska (personal communication with the Alaska Oil and Gas Association, Anchorage, Alaska, February, 1979). The primary shore bases used were Yakutat and Seward. A maximum of 4 semi-submersibles were drilling at any one time. Table E-10 shows a typical complement of shore base operations personnel, exclusive of contractor and helicopter service personnel. Based upon this experience, and assuming equal numbers of personnel were employed

Table E-1
Mean Scenario, Alternative II, 1/ Alternative IV, and Alternative V
Summary of Direct Employment
Man-Months

Year	Mining	Construction	Transportation	Total	Average Annual Employment 2/
1980	Lease Sale, June 1980				
1981	1269		495	1764	147
1982	2178		1045	3223	269
1983	2178		1045	3223	269
1984	1724	900	765	3389	283
1985	816	1400	270	2485	207
1986		5630		5630	469
1987	1904	7530	1320	10754	896
1988	2772	5400	2040	10212	851
1989	3984		2760	6744	562
1990	3344		2760	6104	509
1991	3712		2760	6472	539
1992	2064		2280	4344	362
1993	2524		2280	4804	400
1994	2616		2280	4896	408
1995	2728		2280	5008	417
1996	2728		2280	5008	417
1997	2728		2280	5008	417
1998	2728		2280	5008	417
1999	2728		2280	5008	417
2000	2728		2280	5008	417
2001	2728		2280	5008	417
2002	2728		2280	5008	417
2003	2728		2280	5008	417
2004	2728		2280	5008	417
2005	2616		2280	4896	408
2006	2524		2280	4804	400
2007	2432		1920	4352	363
2008	1580		480	2060	172
2009	1580		480	2060	172
2010	1580		480	2060	172
2011	1580		480	2060	172
2012	1580		480	2060	172
2013	1580		480	2060	172
2014	1580		480	2060	172
2015	1580		480	2060	172
2016	1580		480	2060	172
2017	1580		480	2060	172
2018	1580		480	2060	172
2019	1580		480	2060	172
2020	1488		480	1968	164
2021	1396		480	1876	156
2022	1304		480	1784	149
2023	1212		480	1692	141

1/ Delay of sale would affect the timing, but would not affect the number of direct employees.

2/ Average annual employment equals total man-months divided by 12.

Source: BLM/Alaska OCS Office, 1979.

Table E-2
Mean Scenario, Alternative II, 1/ Alternative IV, and Alternative V
Exploratory Phase
Equipment/Man-months

Year	Drilling Rigs (Mining)	Supply/Support Aircraft/Vessels (Transportation)	Shore bases (Mining)	Total Man-months	Average Annual Employment
1980	Sale June, 1980				
1981	(2) 909	(3/4) 495	(3) 360	1764	147
1982	(2) 1818	(3/4) 1045	(3) 360	3583	299
1983	(2) 1818	(3/4) 1045	(3) 360	3583	299
1984	(2) 1364	(3/4) 765	(3) 360	2849	238
1985	(1) 455	(2/2) 270	(3) 360	1084	90

Table E-3
Mean Scenario, Alternative II, 1/ Alternative IV, and Alternative V
Estimated Construction Employment
Development Phase

Year	Platform Installation	Shore Base	Pipeline Construction	Oil Terminal	Total Man-months	Avg. Annual Employment
1980	Lease Sale, June 1980					
1981						
1982						
1983						
1984		900			900	75
1985	1400 2/				1400	117
1986	1400		4230		5630	469
1987			4230	3300	7530	628
1988			2100	3300	5400	450

1/ Delay of sale would affect the timing, but would not affect the number of direct employees.

2/ A period of 14 months is assumed to install, finish, and commission each platform; construction effort is allocated over 2 calander years, 7 months in each year.

Table E-4
Mean Scenario, Alternative II, [1] Alternative IV, and Alternative V
Estimated Development Employment
Development Phase

Year		Development Drilling (Mining) [2]	Supply/Support Aircraft/Vessels (Transportation)	Shore Bases (Mining)	Headquarters (Mining)	Oil Terminal Transportation	Production Operations (Mining)	Total Man-months	Avg Annual Employment
1980	Lease Sale, June 1980								
1981									
1982									
1983									
1984									
1985									
1986									
1987	(10)	1184	(3/4)	1320	720			3224	269
1988	(18)	1920	(3/4)	1320	720	132	720	4812	401
1989	(18)	1920	(3/4)	1320	720	240	1440	6744	562
1990	(10)	1184	(3/4)	1320	720	336	1440	6104	509
1991	(14)	1552	(3/4)	1320	720	336	1440	6472	539
1992			(3/2)	840	360	336	1440	4344	362
1993	(5)	460	(3/2)	840	360	336	1440	4804	400
1994	(6)	552	(3/2)	840	360	336	1440	4896	408
1995	(7)	644	(3/2)	840	360	336	1440	4988	416
1996	(7)	644	(3/2)	840	360	336	1440	4988	416
1997	(7)	644	(3/2)	840	360	336	1440	4988	416
1998	(7)	644	(3/2)	840	360	336	1440	4988	416
1999	(7)	644	(3/2)	840	360	336	1440	4988	416
2000	(7)	644	(3/2)	840	360	336	1440	4988	416
2001	(7)	644	(3/2)	840	360	336	1440	4988	416
2002	(7)	644	(3/2)	840	360	336	1440	4988	416
2003	(7)	644	(3/2)	840	360	336	1440	4988	416
2004	(7)	644	(3/2)	840	360	336	1440	4988	416
2005	(6)	552	(3/2)	840	360	336	1440	4896	408
2006	(5)	460	(3/2)	840	360	336	1440	4808	400
2007	(4)	368	(2/1)	480	360	336	1440	4352	363
2008	(4)	368	(2/1)	480	360	168	684	2060	172
2009	(4)	368	(2/1)	480	360	168		2060	172
2010	(4)	368	(2/1)	480	360	168		2060	172
2011	(4)	368	(2/1)	480	360	168	684	2060	172
2012	(4)	368	(2/1)	480	360	168	684	2060	172
2013	(4)	368	(2/1)	480	360	168	684	2060	172
2014	(4)	368	(2/1)	480	360	168	684	2060	172
2015	(4)	368	(2/1)	480	360	168	684	2060	172
2016	(4)	368	(2/1)	480	360	168	684	2060	172
2017	(4)	368	(2/1)	480	360	168	684	2060	172
2018	(4)	368	(2/1)	480	360	168	684	2060	172
2019	(4)	368	(2/1)	480	360	168	684	2060	172
2020	(3)	276	(2/1)	480	360	168	684	1968	164
2021	(2)	184	(2/1)	480	360	168	684	1876	156
2022	(1)	92	(2/1)	480	360	168	684	1784	149
2023	(0)	0	(2/1)	480	360	168	684	1692	141

1/ Delay of sale would affect the timing, but would not affect the number of direct employees.

2/ Assumes 1.3 months to drill 1 well.

Table E-5
Northeastern Gulf of Alaska
95 Percent Scenario--Summary of Direct Employment

Year	Man-Months: Mining	Construction	Transportation	Total	Average [1] Annual Employment
1980 Lease Sale, June 1980					
1981	360		270	630	53
1982	720		495	1215	102
1983	720		765	1485	124
1984	720	900	495	2115	177
1985	360	700	270	1330	111
1986		4930		4930	411
1987	1504	7530	720	9754	813
1988	1588	5400	1440	8428	703
1989	2212		2160	4372	365
1990	1788		2160	3948	329
1991	1104		1440	2544	212
1992	1104		1440	2544	212
1993	1512		1920	3432	286
1994	1604		1920	3524	294
1995	1604		1920	3524	294
1996	1604		1920	3524	294
1997	1604		1920	3524	294
1998	1604		1920	3524	294
1999	1604		1920	3524	294
2000	1604		1920	3524	294
2001	1604		1920	3524	294
2002	1604		1920	3524	294
2003	1604		1920	3524	294
2004	1604		1920	3524	294
2005	1604		1920	3524	294
2006	1512		1920	3432	286
2007	1512		1920	3432	286
2008	1512		1920	3432	286
2009	1232		480	1712	143
2010	1232		480	1712	143
2011	1232		480	1712	143
2012	1232		480	1712	143
2013	1232		480	1712	143
2014	1232		480	1712	143
2015	1232		480	1712	143
2016	1232		480	1712	143
2017	1232		480	1712	143
2018	1232		480	1712	143
2019	1232		480	1712	143
2020	1232		480	1712	143
2021	1232		480	1712	143
2022	1232		480	1712	143
2023	1232		480	1712	143
2024	1232		480	1712	143
2025	1140		480	1620	135

Table E-6
Northeastern Gulf of Alaska
Five Percent Scenario--Summary of Direct Employment

Year	Man-Months: Mining	Construction	Transportation	Total	Average [1] Annual Employment
1980 Lease Sale, June 1980					
1981	1724		765	2489	207
1982	2993		1215	4208	351
1983	3447		1440	4887	407
1984	1724	900	765	3389	282
1985	1269	1400	495	3164	264
1986	815	11280	270	12365	1030
1987	2640	18220	1920	22780	1898
1988	3731	4980	2640	11351	946
1989	5555		3360	8915	743
1990	5711		3360	9071	756
1991	5819		3360	9179	765
1992	2152		2880	5032	420
1993	2936		2640	5576	465
1994	3896		2640	6536	545
1995	4172		2640	6812	568
1996	4172		2640	6812	568
1997	4172		2640	6812	568
1998	4172		2640	6812	568
1999	4172		2640	6812	568
2000	4172		2640	6812	568
2001	4172		2640	6812	568
2002	4172		2640	6812	568
2003	4172		2640	6812	568
2004	4172		2640	6812	568
2005	4172		2640	6812	568
2006	4172		2640	6812	568
2007	3988		2640	6628	553
2008	3120		2280	5400	450
2009	2838		840	3678	307
2010	2838		840	3678	307
2011	2838		840	3678	307
2012	2838		840	3678	307
2013	2838		840	3678	307
2014	2838		840	3678	307
2015	2838		840	3678	307
2016	2838		840	3678	307
2017	2838		840	3678	307
2018	2838		840	3678	307
2019	2838		840	3678	307
2020	2562		840	3402	284
2021	1602		480	2082	174

1/ Average annual employment equals total man-months divided by 12.

Source: BLM/Alaska OCS Office, 1979

Table E-7
Alternative VI
Summary of Direct Employment
Man-Months

Year	Mining	Construction	Transportation	Total	Average Annual Employment 1/
1980	Lease Sale, June 1980				
1981	1269		495	1764	147
1982	2178		1045	3223	269
1983	2178		1045	3223	269
1984	1724	900	765	3389	283
1985	816	1400	270	2485	207
1986		6020		6020	502
1987	1904	3500	1320	6724	560
1988	2772	2100	2040	6912	576
1989	3984		2760	6744	562
1990	3344		2760	6104	509
1991	3712		2760	6472	539
1992	2064		2280	4344	362
1993	2524		2280	4804	400
1994	2616		2280	4896	408
1995	2728		2280	5008	417
1996	2728		2280	5008	417
1997	2728		2280	5008	417
1998	2728		2280	5008	417
1999	2728		2280	5008	417
2000	2728		2280	5008	417
2001	2728		2280	5008	417
2002	2728		2280	5008	417
2003	2728		2280	5008	417
2004	2728		2280	5008	417
2005	2616		2280	4896	408
2006	2524		2280	4804	400
2007	2432		1920	4352	363
2008	1580		480	2060	172
2009	1580		480	2060	172
2010	1580		480	2060	172
2011	1580		480	2060	172
2012	1580		480	2060	172
2013	1580		480	2060	172
2014	1580		480	2060	172
2015	1580		480	2060	172
2016	1580		480	2060	172
2017	1580		480	2060	172
2018	1580		480	2060	172
2019	1580		480	2060	172
2020	1488		480	1968	164
2021	1396		480	1876	156
2022	1304		480	1784	149
2023	1212		480	1692	141

1/ Average annual employment equals total man-months divided by 12.

Source: BLM/Alaska OCS Office, 1979.

Table E-8
TYPICAL DRILLING CONTRACTOR EMPLOYMENT ON
OCEAN RANGER AND OCEAN BOUNTY

ODECO

Drilling Crew		Ship Crew
2 tool pushers**		1 barge master*
2 drillers**		2 control room operators*
2 derrickmen**		
8 floormen**		2 motormen*
2 crane operators**		
8 roustabouts**	Subtotal 5	
2 rig mechanics*		
2 electricians*		
1 assistant tool pusher*		
Subtotal 29		

Total employment equals 68, i.e., 29 + 5 times a rotation factor of 2 equals a total of 68.

These numbers can vary somewhat with drilling conditions and drilling problems.

** 2 shifts
* 1 shift

Source: Dames & Moore, August 1978 (from ODECO, Inc.)

Table E-9
Supply Vessel Personnel

Captain	1
Mates	2
Deck Hands	4
Cook	1
Chief Engineer	1
First Engineer	1
Second Engineer	1
Mechanic	1
Radioman	1 (may be provided by operator)
Subtotal	13

Assuming 40 days on, 20 days off, total employment equals 20.

Source: Dames & Moore, August 1978

Catering contractors provide food and housekeeping services for rig personnel. Based upon Gulf of Alaska experience, a catering crew would consist of 7 employees.

Catering Services

Chief/Manager	1
Night Cook and Baker	1
Gally Hands	5
Subtotal	7

Assuming 28 days on and 14 days off, total employment equals 11.

Table E-10
Estimated Support Personnel Requirements

	On Duty	Off Site
Dock manager	1	0
Bookkeeper	1	0
Material expediters	4	2
Crane/forklift operators	2	1
Longshoremen	7	7
Subtotal	15	10

Total employment equals 25.

Source: BLM/Alaska OCS Office, 1979.

at each primary shore base, approximately 50 contractor personnel and 10 operator personnel would be employed in onshore support activities.

Mud engineering and mud logging may or may not be provided by the same firm. Mud engineering firms supply the drilling muds. Based upon previous gulf activity, 1 such engineering position is required during drilling; the position is filled by 1 engineer on call 24 hours per day, working 7 days on and 7 days off (Dames & Moore, August 1978, pp. 38-39, from Magcobar and Schlumberger). Extrapolating this experience to the future, 2 mud engineers would be required per rig, 1 on duty and 1 off duty.

Well logging services include mud logging and electric logging. Based upon Gulf of Alaska experience, mud logging typically requires 2 men on board the drilling rig, each working a 12-hour shift. Electric logging does not require a permanent crew aboard the vessel. Contracts with operators required 3 men assigned to each rig who would provide services as required. A typical trip to the rig for the 3 men would require about 5 days. Two or more trips might be made to the rig per month by the 3-man crew. Special problems could require more frequent service (Dames & Moore, August 1978, p. 39, from Schlumberger). Thus, employment per rig to perform the well logging function is 7.

Cementing is the primary completion service resulting in offshore employment. One engineer may be assigned to each rig. This engineer would be on call on a 24-hour basis, working 21 days on and 21 days off (Dames & Moore, August 1978, p.40, from Halliburton). Cementing services would account for the employment of 2 engineers per active rig.

Diving services may involve up to 7 divers per rig, however, only 2 would live onboard to maintain and ready equipment between dives. Diving services would thus account for a maximum of 7 employees per rig (Dames & Moore, August 1978, p.40, from Oceaneering); 3 full time equivalents are assumed here.

As stated earlier, operators perform the supervisory and administrative functions governing an exploratory drilling program, overseeing drilling and logistics activities, evaluating drilling results and administrative support. The number of operator personnel varies by company, and presumably, by the specific drilling program itself. (Reference the Notices of Support Activity submitted by operators in compliance with sale 39, Stipulation No. 5.) Notices submitted as a result of sale 39 indicate a total operator complement of 10 per rig is representative, including onshore logistics personnel. Allowing 2 onshore logistics positions (already accounted for under the shore facility discussion), a total of 8 (additional) operator personnel per rig is assumed here.

Development Activities: The results of exploratory drilling will be evaluated and the decision made as to whether or not the next stage of operations will be undertaken. If the results of the exploratory activity do not reveal economically producible quantities of oil and/or gas, no further impacts would result from this proposed sale. However, for assessment purposes, exploratory drilling is assumed to yield commercial deposits of oil and natural gas.

The production of the estimated recoverable oil resources would require the construction and placement of production structures, and the drilling of development wells, along with the construction of support bases and facilities for gathering, storing, and transporting oil and gas from the acreage leased.

The precise type of production facilities, the number of development wells required, the location of any onshore facilities required, and the possible route of pipelines and other transportation facilities required to bring the produced oil and gas to shipping terminals will be primarily dependent on the information gained as a result of the exploratory drilling, substantiated and modified by additional data obtained as a result of developmental drilling. Other factors influencing the type of facilities required (in addition to the number of fields discovered), are water depth, character of the sea floor, depth to the producing horizon, number of wells required for efficient recovery, i.e., the spacing of the wells, and the structural position of the producing wells.

Offshore Employment: Development activity is distinguished from exploration activity in terms of both the level (and intensity) of activity and, to a lesser extent, functions performed. Drilling and well service personnel requirements are generally less. Assuming normal circumstances, measurements of well data are fewer, casing and drill string needs may be less and diving services generally are not needed. The reduced need for services decreases drilling related employment (on a per active rig basis) in the development phase.

Total onboard drilling crew requirements are estimated at 27 (2 fewer than estimated for exploratory drilling); assuming a rotation factor of 2, total drilling crew employment would be 54 per active rig.

Total well service personnel requirements are estimated at 7. Functions included are mud engineering, cementing, special casing crews and personnel which may be required in survey and fishing services. The estimate represents an average of well service personnel. Periodically, during the drilling of a well, special crews are needed to perform specialized functions, however, these tasks are of limited duration. Thus, an allowance or overall average of 7 is used to reflect these periodic services (Alaska OCS Office and personal communication with Mobil Oil, Anchorage, Alaska, February 1979).

Table E-11

Estimated Production Platform Operations Personnel

Platform Personnel	Day Shift	Night Shift
Foremen	1	1
Production operators	4	4
Electricians	1 or 2	1
Welders	2	
Mechanics	1 or 2	1
Roustabouts	4	2
Subtotal	14	9

Assuming a rotation factor of 2, total employment equals 46, i.e., 23 x 2 = 46.

Source: BLM/Alaska OCS Office and Mobil Oil, 1979.

Production platform operation personnel are estimated in table E-11. It is judged that production platforms placed in the Gulf of Alaska would be similar to existing platforms in upper Cook Inlet, i.e., steel bottom-founded, with certain design accommodations, e.g., for greater water depth. Based upon upper Cook Inlet experience, onboard production employment is estimated at 23; a 1 week on, 1 week off work schedule is assumed, hence, total employment would be 46.

Catering services employment is assumed comparable to that estimated for exploration activity, i.e., a total of 11 would be employed in catering services.

Similarly, shore based operating and supply/support personnel requirements are judged similar to exploration phase requirements. Each fully staffed shore base is assumed to require a total operating complement of 25, or half that amount when only 1 rig is active. Each active rig is assumed to require the services of 1 helicopter of the Sikorsky S-61 type, plus a common backup at all times. Each active (development) drilling rig is assumed to require the services of 2 supply vessels; upon completion of development drilling, each platform is assumed to be serviced by a single supply vessel.

Table E-12 summarizes production, drilling, and supply/support related employment assumptions.

Production Treatment and Crude Oil Terminal Facilities: The size, nature, and capacity of production treatment facilities would depend upon many factors, including the volume of water produced. For example, greater quantities of water requiring treatment may be produced in the latter stages of a field's production life than in the initial years of production. Thus, as greater treatment is required, employment may increase. It is assumed here, however, that each production treatment facility would require a total of 85 employees throughout its life. It is also assumed that production treatment facilities are co-located with the oil terminal.

Based on upper Cook Inlet experience (Drift River), approximately 30 personnel would be required to operate each crude oil terminal, along with an administrative support staff of 5, for a total of 35. Each crude oil tanker terminal facility would employ a total of 120 workers, 85 in production treatment operations and 35 in storage and tanker terminal operations (Alaska OCS Office, from Kenai Pipeline Co.).

Technical and Management Operations Staff: Technical and management operations staff (e.g., geologists, engineers, drilling foremen, and managers) would be phased in commensurate with the level of development and production activity. Headquarters staff are assumed to be phased in at the ratio of 40 employees per 200,000 BBLs per day oil production. However, as the physical and operating characteristics of the producing

Table E-12

Estimated Production, Drilling, and Supply Support Employment - Development Phase

Each Active Rig/Platform	
Drilling crew	54
Operator personnel	8
Well service personnel	7
Production operators	46
Catering services	11
Supply/support	
Shore base operations	50
Operator personnel	10
Helicopter (each)	10
Supply vessel (each)	20

Source: BLM/Alaska OCS Office, 1979.

fields become better defined, and as production declines, the technical and management staff may be consolidated or reassigned. Notwithstanding, headquarters staff are assumed held constant until oil production ceases, then halved to reflect gas production only.

Construction Activity: Development and production activities must be preceded by the construction, installation, and assembly of permanent platforms, pipeline construction for transport of the produced oil and gas to production treatment facilities and terminals, and shore base construction.

Platform Installation: The installation of the platforms will involve the temporary employment of specific contractors for specific tasks such as platform construction, placement, pile driving, deck structure placement, and finishing. It is assumed all platforms will be constructed at facilities outside Alaska, towed to the field location, set in place, deck structures installed and finished. Typically, tug crews, derrick barge personnel, welders, electricians, equipment installers, and others are employed for brief periods during placement and assembly of the platform.

The total of personnel required to set and assemble multiple platforms per season will depend on many factors such as the number of platforms to be set, environmental constraints (e.g., weather), the type and availability of equipment used and the number of oil field operators involved. For assessment purposes, it is assumed a complete work crew consisting of the above mentioned skills approximates 100 workers. Because of the relatively short offshore construction season (approximately April to September), few economies of scale may be realized in platform installation. For example, the length of the construction season may not permit the use of a single derrick barge for deck structure placement on 2 platforms; 2 barges in simultaneous operation may be required. For purposes here, a complete work crew (and equipment) is assumed as required to install each platform. Note, however, that individual crews would be on-site less than 6 months, and many would be housed offshore. It is assumed 14 months are required from installation to commissioning; thus, in estimating average annual employment, 7 months of construction effort is allocated to the year a platform is shown as "installed", and 7 months of effort in the following year.

Pipeline Installation: Pipelines linking the platforms to terminals must be fabricated and installed using a pipe-lay barge. On and offshore pipelines are assumed to be constructed. Offshore pipelines will be constructed by means of pipe-lay barges working primarily during the summer season. It is anticipated that the major effort of onshore pipeline construction will also occur during the summer months. It is not expected that offshore pipeline construction would provide year-round employment, i.e., offshore pipeline construction is anticipated to require approximately 6 months in any year.

It is anticipated that large pipe-lay barges similar to those utilized in the North Sea would be used for offshore pipeline construction. These units are largely self-contained, including living quarters, thus, it is estimated the majority of these personnel would be housed offshore.

Based upon experience in the North Sea, each lay barge of the type described may install approximately .5 mi of offshore pipeline per day, including an allowance for non-productive time due to weather conditions. It is estimated 1 lay barge would be required for a period of 6 months, per construction season, in the installation of offshore pipelines. Workers are not normally rotated on and off the work location for off-duty periods, thus no rotation factor is used.

Estimated on and offshore pipeline construction employment for the development phase is shown in table E-13. Approximately 325 workers may be required in offshore pipe-laying operations, plus an administration and support staff of about 30 per unit. Onshore, a peak work force of approximately 150 persons would be required in pipeline construction activity, plus technical and staff support of about 25.

Onshore Facilities - Supply/Support Bases, Production Treatment and Crude Oil Terminal Facilities: The construction of onshore facilities will involve the employment of construction personnel on a variable basis depending upon the season and specific skill required at any given time. Existing facilities may be utilized (in the case of shore bases), as well as new facilities constructed near existing communities or in remote locations such as Icy Bay. At remote construction sites, personnel will probably be housed in camps and be similarly housed in camps near existing communities where the community infrastructure cannot accommodate the additional services required.

Terminal and Production Treatment Facility Construction: One oil terminal with production treatment facilities is assumed. The construction of production treatment capacity and a terminal for receiving the crude oil produced offshore, storing it, and transferring it to tankers would require the employment of an estimated 200 onsite workers and a headquarters support staff of 25. It is assumed construction workers would work 4 weeks on and 1 week off, or 8 on and 2 off, hence the rotation factor would be 1.25 (Alaska OCS Office, from Fluor). Total employment would be 275, i.e., 200 times 1.25 equals 250 plus 25. It is assumed the terminal would require 2 years to construct.

The facilities would be built in relatively remote areas, in which case construction workers may be housed in camp facilities onsite. Construction employment can be expected to reflect the highly seasonal nature of Alaskan construction.

It is probable that during the life of oil production from offshore fields, repairs and modifications will be made to the terminals and other facilities which require the services of different groups of construction workers with specialized skills during the useful life of the facility.

Supply/Support Base Construction: Supply/support bases will be required to service offshore development and production activity. Potential sites include those where the necessary facilities would be expanded upon the existing infrastructure (e.g., enlargement of piers, site improvement, etc.), and those where supply/support facilities would be constructed "from the ground up" at remote sites. Because this possible mix of facilities use/construction is unknown, and the fact that engineering requirements would vary from site-to-site, it is not possible to estimate construction employment with any accuracy. An allowance of 75 workers for a period of 1 year is therefore included in an attempt to reflect this activity (Alaska OCS Office, from Bomhoff Associates). These workers would consist of "offshore" crews (pile driving, tug and barge personnel employed in pier loading or dock construction), heavy equipment operators, carpenters, welders, electricians, etc.

Construction activity would likely continue through the life of production due to upgrading and expansion or addition of facilities; however, the level of activity may vary greatly from year-to-year, and excepting major projects, would be small compared to the initial years of the development phase.

Table E-13

Estimated Seasonal On and Offshore Pipeline

Peak Construction Employment

Development Phase

Units	Employment/Unit	Total Employment/Unit
OFFSHORE		
(1) Lay barge	250 (125/shift)	250
Catering, etc.	5-6	6
(2) Tugs-Anchor Handlers	10	20
(2) Tugs-Supply	10	20
(3-4) Supply Barge	0	0
(2) Supply Boat	13	26
Misc. Equip. & Maint. Oprtns.	2-3	3
Subtotal		325
Admin. & Staff Support	30	30
Total		355
ONSHORE		
Onsite const. & supply	150 (75/shift)	150
Admin. & Staff Support	25	25
Total		175

Source: BLM/Alaska OCS Office, 1979 and Santa Fe International Corp, 1979.

APPENDIX F

WEIGHTS AND MEASURES

WEIGHTS AND MEASURES

All units of weights and measures are metric unless otherwise stated. The following is a conversion table from the metric system to the English system:

Metric		English
LENGTH		
1 millimeter (mm) [0.1 centimeter (cm)]	=	0.0394 inch (in.)
1 cm [10 mm]	=	0.3937 in.
1 meter (m) [100 cm]	=	39.37 in.
	=	1.09 yard (yd)
	=	3.28 feet (ft)
1 kilometer (km) [1000 m]	=	0.621 mile (mi)
1 nautical mile [1852 m]	=	6076.1 ft
	=	1 minute of latitude (approx.)
AREA		
1 square centimeter (cm^2)	=	0.155 square inch ($in.^2$)
1 square meter (m^2)	=	10.76 square feet (ft^2)
	=	1.196 square yards (yd^2)
1 hectare (ha)	=	2.4710 acres (a)
1 square kilometer (km^2)	=	0.386 square mile (mi^2)
VOLUME		
1 cubic centimeter (cm^3)	=	0.0610 cubic inch ($in.^3$)
1 cubic meter (m^3)	=	35.314 cubic feet (ft^3)
	=	1.31 cubic yards (yd^3)
1 liter	=	1.06 quarts (qt)
	=	0.264 gallon (gal)
159.18 liters	=	1 barrel of oil (42 gal)
MASS		
1 kilogram (kg) [1000 grams (g)]	=	2.20 pounds (lb)
	=	0.0011 ton
1 metric ton (MT) [1000 kg]	=	1.10 ton
	=	0.9842 long ton (LT)
136.2 kilograms	=	1 barrel of oil (300 lbs)
PRESSURE		
1 kilogram per square centimeter (kg/cm^2)	=	14.20 pounds per square inch ($lb/in.^2$)
	=	2048 pounds per square foot (lb/ft^2)
VELOCITY		
1 meter per second (m/s)	=	3.281 feet per second (ft/s)
1 kilometer per hour (km/h)	=	0.9113 ft/s
	=	0.621 mile per hour (mi/h)
1 knot (kn) [1852 m/h]	=	1.6878 ft/s
	=	1.151 mi/h

APPENDIX G

COMMENTS FROM SCOPING

The following are comments, both written and oral, resulting from the proposed sale 55 (Eastern Gulf of Alaska) scoping process. These comments have been submitted by Federal agencies, State of Alaska representatives, as well as public meetings in both Anchorage and Yakutat, Alaska.

1. Federal Agency Responses - February 26, 1979:

a. Joe Jones, Manager, Conservation Division, U.S. Geological Survey:

> "Contribution to the impacts on the area from oil and gas operations would be that this area is very similar to the Sale 39 area, as related say, particularly to the services that you need and the supplies that you need for oil and gas exploration. The difference would be that Seward and Cordova would probably be less important than they were for Sale 39.
>
> Yakutat should have essentially the same impacts that they had for the first sale. The impact was not great. There were no discoveries made, so impacts as they were shown in the exploratory phase of our EIS and our other documents, the exploratory phase worked out just about the way it had been previously predicted. There was a small, positive impact. I don't know of any negative impacts on the City of Yakutat. There may have been a few, but I would hazard a guess that the impact for this sale area as far as service and supply would be essentially the same as it was for the Sale 39 area. It would entail, perhaps, the leasing of some lands for storage and perhaps--I believe they have dock facilities there that they worked out and are still available for this sale area."

b. Bill Williamson, Attorney with the Department of Energy, Seattle:

"There are certain requirements within the CEQ Regulations themselves. . . at 40 CFR, section 1501.7, sub b, and that says:

> 'Identify other environmental review and consultation requirements so the lead and cooperating agencies may prepare other required analyses and studies concurrently with, and integrated with, the environmental impact statement as provided in 1502.25.'
>
> (NOTE: Paragraph citation erroneously identified; should be 40 CFR 1501.7(a)(6).)

I think a very important area which has been going on in the State of Alaska has been the development of the State's Coastal Zone Management Program. . . . The OCS Lands Act Amendments of 1978, I think, are important and I wanted to point out at least one section to BLM. . . . I just wanted to point out that the first section of the act, which I felt was important for this particular stage of the lease sale appears at Section 18, and that's entitled Outer

Continental Shelf Leasing Program. We go from there to. . .sub d, sub 2, and there are certain criteria which I'll just read to you what it says in the statute. It says:

> 'Timing and location of exploration, development and production of oil and gas among the oil and gas bearing physiographic regions of the outer continental shelf shall be based on a consideration of. . . .'

And there is a list of, I guess that would be about 8 or 9 factors which I feel should be considered in any scoping session that BLM undertakes. And among those are, I think someone pointed out this morning, potential sites of deep water ports--that's not important--but including fisheries, navigation, and sea lanes. So those are issues, if you want to call them that, which BLM is empowered to consider, and I just wanted to bring those criteria to your attention for the purpose of this meeting.

I think a more subtle issue which BLM should also look at is something which the American Petroleum Institute made known to the Department of Energy, and I have a letter. . .I wanted to read one part of that letter. It's an October 31, 1978, letter from the Petroleum Institute of Washington, D.C., to Mr. Robert Calter, Director of the Office of Leasing Policy Development, U.S. Department of Energy, and it's just entitled Constraints on OCS Development. But what he points out and which by the way is just simply something which is stated in the OCS Lands Act, and that is a requirement which appears at Section 18, sub f, sub 5. And that says:

> 'The Secretary shall by regulation establish procedures for: (5) Consideration of the coastal zone management program being developed or administered by an affected coastal state pursuant to Section 305 or 306 of the Coastal Zone Management Act in 1972.'

What I think is important is the fact that the State of Alaska does not have a final, approved CZM program, but what they do have is a draft program which is now in the 305 stage. Under this section which I just read, due consideration will have to be given to the state CZM program. Now what that appears to mean is that in your scoping sessions, and as you're developing the draft environmental impact statement, some consideration should be given to this document even at this stage, and many of you already know that, but I just wanted to bring that up I think as an issue. And also the fact that this lease sale occurs next to the Yakutat area. . . I think it's important for us to note that Yakutat does have a proposed district coastal program which, if and when that is approved, will become a part of the State's Coastal Zone Management Program. So here we have a district coastal program which I have not seen by by the way. . .but it's just something I wanted to make BLM aware of while I was here, and I think it is an important issue. By the way, I think if you do look at the state's CZM program, there's some pretty startling revelations when you look at the standards

and guidelines which BLM may have to consider. And one of these appears in Alaska's statutes, an Administrative Code. I'll just give you that section: 6 Alaska Administrative Code 80.070 entitled Energy/Facilities, and it just simply states:

> 'Sites suitable for the development of major onshore, nearshore and offshore, and outer continental shelf energy facilities must be identified by the state in cooperation with districts.'

Well, that may appear to mean that perhaps Yakutat or the State of Alaska, that there'll have to be some consideration given them or perhaps their preference as to what sites are suitable and what sites are not suitable to them. Now the OCS Lands Act Amendments is pretty liberal in that area already, but I just wanted to bring that out as an issue which I felt, as I understand these CEQ Regulations and that section which I stated at the beginning where we have these simultaneous environmental processes, if you want to call it that, the Coastal Zone Management Act, I think that that section will have to be met, and I point out to you that I'm going to look a little farther into the Alaska CZM Program. We're reviewing this because their final comments are due on the draft... but if I see any other parts of the Alaska CZM Program which come to my mind as affecting any lease sales, or even future lease sales, we'll make those comments known to BLM."

c. Fred Thorsteinson, NOAA/NMFS, Juneau:

"Our Office of Coastal Zone Management, as part of NOAA, has asked me to make sure that you consider the State's coastal zone plan.

Secondly, I wanted to tell you some of our own concerns, National Marine Fisheries Service. We have a large interest in the salmon coastwise. The Fairweather Ground is an important trolling area, particularly chinooks are intermingled from hatcheries and rivers, from Southeast Alaska, British Columbia, Washington, Oregon, and the Columbia River. There's some concern over one of the endangered of one of the upriver stocks of chinooks in the Columbia River. In fact, there's been some consideraton now of placing it on the Endangered Species List. I don't know just where that is--the idea may be dropped, but I think that you should look into this. Further, the chinooks in Southeastern Alaska themselves are in serious short supply and although the State has a program for building up these stocks by really restricted fishing regulations, this would take a long time to take effect, so anything that might place an additional stress on the chinooks themselves should be considered.

Another consideration is the fact that the endangered great whales--some of these species may transit the area. We may be able to resolve this problem by Section 7 consultation because it may not

really present a problem, but this has to be explored between BLM and NMFS.

Then, as you all know, this area is heavily fished both by foreign fleets. . . . The fishing efforts concentrated largely along the 100 fathom curve . . .which bisects that area, so there may be some interference with commercial fishing activities.

Lastly, while it may not be important, because of the westerly set of the Alaska Current, I should call to your attention that the area to the westward (Prince William Sound and around Kayak Island) has been nominated as a marine sanctuary, although it is not under active consideration at this time, it's something that should be explored."

Question by Joe Jones, U.S.G.S.:

"In this area we anticipate not more than 2 or 3 drilling rigs at any particular time in that area, and they would probably be of the semisubmersible type. Would you consider just that as interferring with your fishing?"

Reply by Fred Thorsteinson, NMFS:

"Probably not because there would be plenty of notice given as to the location. The fishing ranges up to 80 miles off the coast (commercial salmon trolling) and it is spread out and they only get out there when the weather is pretty good, but they do range along coastwise somewhat too. I think as long as there is plenty of advance warning given to the--and it may be possible that they'd be in and out of there before there was any fishing."

Question by Joe Jones, U.S.G.S.

"You're coming back, I suppose, to the oil spill potential."

Response by Fred Thorsteinson, NMFS:

"Yes, this is part of it, and part of it is fishermen, I know, are prone to cry wolf if there were any kind of an accident we'd be hearing about it for many years.

You might want to consider too the so-called Fisherman's Compensation fund, as part of the OCS Amendments, whereby any fisherman who can prove damage to his gear or to his operation can claim the compensation if it was oil activity induced."

d. Carolyn Elder, Heritage Conservation and Recreation Service:

"We would be concerned mainly from the point of view of oil spills and onshore support facilities.

As far as archeology and historic, there probably would need to be some surveys done because I don't think this has been well surveyed. There are some known archeological sites in this area around Yakutat and we'd be concerned about those. And also I don't know if you're planning to do an undersea survey like was done on the Beaufort, but we probably would encourage that. That shelf area could have a lot of potential for undersea sites because during the last glaciation this whole continental shelf here was, of course, exposed and it was a passageway. . .just seaward of the coastal mountains, this whole area was open for people and there should be some neat stuff out there, and I don't know whether any of it is recoverable or not. . . . So that and any onshore support facilities that might have an impact on cultural resources. . . .

Recreation: We have as of December 1, two national park areas--Wrangell-St. Elias National Monument, excluding Icy Bay, and Glacier Bay National Monument, which was expanded by President Carter's proclamation December 1, excluding Dry Bay but it goes up along the Alsek River. It takes in the watershed of the Alsek, except for Dry Bay. This whole area that you're dealing with, hopefully it will be a national park whenever Congress acts on it. Malaspina Glacier is a registered national landmark, which basically means that we're interested in it. I don't think it means too much more than that. It means we can't use any Federal money to do anything to it, but basically we're concerned about it. And we're concerned about the whales too."

e. Floyd Sharrock, Heritage Conservation and Recreation Service:

"Relative to what Carolyn was saying and the reference to the CEQ guidelines (CFR 1501 I think it was) I believe this has been interpreted to mean that the separate responsibilities of Executive Order 11593 and the National Historic Preservation Act of 1966 are to be reflected in the environmental document, and it can be combined with that document if appropriate. Once this initial inventory is done, then there would be a determination of sites that are on our eligible for listing on the National Register of Historic Places, and they can be dealt with in one of several regards here. If the project is to proceed, then the appropriate action relative to any sites that are determined eligible could be worked out with the Advisory Council on Historic Preservation as would be appropriate.

I'm not sure what the status of the House Joint Resolution on the American Indian religious freedom is, but I believe the Department of the Interior has worked out some guidelines and the concern for

such areas, I believe, we are directed to reflect that concern or to reflect that we have had input from concerned native American groups as to the affects of such an action on their religious freedom. I'm a little hazy on this, but I believe the Department of the Interior has worked out some procedures there. I think other Federal agencies have not. This might be something to check into."

f. Jerry Reid, U.S. Fish and Wildlife Service:

"One of the things we were concerned about, and because we have an EIS for Sale 39 which more or less encompassed part of this, many of the overall concerns have already been covered. One of our concerns early on was the fact that biologically we were pretty ignorant about this area and so we required in Sale 39, we required and we advised U.S.G.S., that prior to the issuance of drilling permits for the exploratory drilling, that we would like to have a little better idea of what was on the bottom and what they might be damaging, or what might be impacted. This wasn't done in a vacuum. National Marine Fisheries Service had input, the State had input, everybody had input. And as it turned out, these were required--the Oil and Gas Supervisor required that pre-drilling biological surveys on a site specific basis be conducted, and these were done on about...7 of the holes that were drilled. And the upshot of it was that for all intents and purposes it was not causing any recognizable, long-term effects. So the decision was made later on that these sort of surveys were no longer needed in this particular area. And I believe this will hold true for any drilling that will occur down here (indicating Sale 55 area on map) because the environmental setting is very, very similar. . . .

One of the things Fish and Wildlife Service requested. . .was that there be a 6-mile buffer zone, or horizontal buffer zone, around seabird rookeries and marine mammal rookeries, and we identified these and this was, of course, at the time we were looking at the call of the whole area, and we identified them along the coast. Most of them are no longer of any concern. However, we still have some seal haul-out areas, also some waterfowl migrational use areas in some of thse estuaries, and as the process goes on, we will be requesting again that this 6-mile buffer zone be applied to these particular areas."

ALASKA OCS OFFICE
ANCHORAGE, ALASKA
MAR 6 9 23 AM '79

Department of Energy
Washington, D.C. 20545

MAR 1 1979

Mr. Henry Noldan, Acting Manager
Alaska Outer Continental Shelf Office
Bureau of Land Management
Department of the Interior
Post Office Box 1159
Anchorage, Alaska 99510

Dear Mr. Noldan:

This is in response to your letter of February 2, 1979, to Mr. Schlesinger regarding the environmental impact statement (EIS) scoping meeting to be held on February 26, 1979, in Anchorage, Alaska.

We very much appreciate your invitation to attend the meeting but regrettably were unable to send a representative from DOE Headquarters.

At the same time, we do wish to remain informed on your progress on this EIS.

Sincerely,

Ruth C. Clusen
Assistant Secretary
for Environment

United States Department of the Interior

ALASKA OCS OFFICE
ANCHORAGE, ALASKA
MAR 12 10 39 AM '79

NATIONAL PARK SERVICE
Alaska Area Office
540 West Fifth Avenue, Room 202
Anchorage, Alaska 99501

IN REPLY REFER TO:

L7619

March 8, 1979

Mgr.
Asst. Mgr.
Ops. Coord.
Tech. Info.
Env.
Prod. Dev.
Prod. Eng.
Offs. Ops.
Offs. Adm.
Supv. CA

A-Action
I-Info

Memorandum

To: Manager, Alaska OCS Office

From: Acting Area Director, Alaska Area Office
National Park Service

Subject: Resource Report for a possible Eastern Gulf of Alaska Oil and Gas Lease Sale

The Wrangells-St. Elias National Monument, created by President Carter on December 1, 1978, contains 10.95 million acres in south central Alaska with a coastal area of nearly 80 straight line miles from Icy Bay to the upper end of Yakutat Bay. The National Monument was created to retain unspoiled for public use and benefit the grandeur and setting of the mountain kingdom of the Wrangells, Chugach and St. Elias Ranges and certain of its associated lowland, and to protect and interpret the area's historic sites, structures, objects and the local way of life.

A second National Monument which lies adjacent to the proposed lease sales area is Glacier Bay National Monument. It contains 2.4 million acres which include 500,000 acres within the recent extension. Coastal areas within the Monument face the Gulf of Alaska between the Doame River on the north to Cross Island, a straight line distance of nearly 90 miles. This National Monument was created to protect and interpret great tide water glaciers, a dramatic range of plant communities and a variety of animals including marine mammals, birds and fish. Exploration and/or development of oil and gas resources in the area of the proposed Eastern Gulf of Alaska sale area poses potential negative impacts to resources within these two National Monuments.

Beaches are most important in winter when the snowcover is deep and the streams are devoid of salmon. Then, invertebrates of the intertidal zone and carrion cast up by the sea, provide food for almost every

animal active in the area. The numerous coastal lakes and streams provide spawning grounds for at least four of the five Pacific salmon species, as well as steelhead, cutthroat trout and Dolly Varden char. These fish are harvested heavily by Natives pursuing subsistence life style. Estuaries support larval and immature stage of many marine animal species, and the coastal zone includes herring, a major link in the food chain, which themselves feed principally on plankton.

The coastal area was occupied prehistorically principally by Tlingit Indians with the Eyak Indians represented in the Copper River delta area. Although there are numerous sites located within these National Monuments, the most significant ones are located in the interior. Presently, the Tlingit people of Yakutat participate in both the subsistence economy and the market economy. Resources important to them are seal, salmon, halibut and certain shell fish. The malaspina forelands are important subsistence grounds. Natives in the interior depend heavily on subsistence use of anadromous fish during their migration. The marine resource found here could be severely impacted by oil spillage or drilling contamination.

For the protection of underwater archeological sites that may be located on the submerged portions of the Wrangells-St. Elias and Glacier Bay National Monument we request full implementation of Secretarial Order No. 2974 (Revised), as it relates to cultural resource assessment stipulations if drilling should occur.

In addition to this agency's mandated responsibility to protect resources within the Wrangells-St. Elias and Glacier Bay National Monuments, we also are concerned with aesthetic values which may be vulnerable to industrial activities visually adjacent to Monument lands and waters. We therefore request you consider such potential impacts to the National Monument in your final evaluations for the Eastern Gulf of Alaska oil and gas lease sale.

Robert L. Peterson
Acting Area Director

cc:
Glacier Bay National Monument

OFFICE OF THE DIRECTOR

ALASKA OCS OFFICE
ANCHORAGE, ALASKA
MAR 20 9 29 AM '79

United States Department of the Interior
BUREAU OF MINES
2401 E STREET, NW.
WASHINGTON, D.C. 20241

March 12, 1979

Memorandum

To: Manager, Alaska Outer Continental Shelf Office, Bureau of Land Management, Anchorage, Alaska

From: Director, Bureau of Mines

Subject: Proposed Oil and Gas Lease Sale #55, Eastern Gulf of Alaska

In regard to your request for issues that should be addressed in the environmental statement to be prepared for this OCS sale, there is a potential conflict with non-fuel minerals. As we mentioned in our February 23, 1979, memorandum on the possible Bering-Norton Oil and Gas Sale, responsibility for fuel supply/demand analysis and related information was transferred to the Department of Energy by Public Law 95-91 on October 1, 1977, and DOE should be contacted for issues related to fuels.

There has been past mining of beach gold placers in the onshore area between 138°-142° west longitude, and in the onshore area to the east and west of the proposed sale boundaries. In addition, concentrations of heavy minerals such as magnetite and ilmenite along with traces of chromite, zircon, and platinum have been found in some placers. The Bureau of Mines and the Geological Survey have conducted limited studies of the potential of these beach placers and although the results did not uncover significant resources the investigations were limited in area and to 25 feet of depth.

Investigations for offshore placer deposits have been more limited, however the offshore area being proposed for sale has a definite potential for concentrations of minerals in placer deposits, a result of onshore sands being dynamically worked by the surf and carried seaward.

Director

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

ALASKA OCS OFFICE
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
MAR 16 9 40 AM '79 WASHINGTON, D.C. 20460

12 MAR 1979

OFFICE OF THE ADMINISTRATOR

Mr. Henry Noldan
Acting Manager
Bureau of Land Management
Alaska Outer Continental Shelf Office
P.O. Box 1159
Anchorage, AK 99510

Dear Mr. Noldan:

In response to your letter of February 9, 1979, file 3315/#55 the following is submitted:

Scoping - 1) In the future we request that copies of the scoping letters and reports also be sent directly to our EPA Alaska Operations Office in Anchorage, Alaska and our Region X Office in Seattle, Washington. This would assure timely notice for us to participate in these meetings.

2) The notification letter in addition to the CEQ regulations in scoping should also include a proposed substantive outline of the specifics which will be considered in the scoping process.

Size of Proposed Lease - Our letter dated April 28, 1978 expressing our concerns on this issue is enclosed for your convenience.

OCS Orders for the Gulf of Alaska - We are still concerned that final orders covering operations in this area are incomplete. Orders No. 6, 8, 9, and 11 have not yet been published and approved. We do understand that considerable work is being done on Order No. 8 and it should be published in the near future. We continue to recommend that final operating orders be in effect before the lease takes place. Our previous detailed comments on this subject are submitted as enclosures.

Thank you for the opportunity to provide these comments.

Sincerely yours,

William N. Hedeman, Jr.
Director
Office of Federal Activities (A-104)

Enclosures

GTurner:to:AMR:A-104:x50770:4/28/78
file: A-BLM-A02124-AK
cc: Reviewers

28 APR 1978

Mr. Edward J. Hoffman
Manager
Alaska Outer Continental Shelf Office
U.S. Department of Interior
P.O. Box 1157
Anchorage, AK 99501

Dear Mr. Hoffman:

In response to your letter of January 24, 1978, we have completed our review of the information available to us regarding the proposed Gulf of Alaska Outer Continental Shelf Lease Sale (OCS#55) off the Central Coast of Alaska from Chichagoe Island to the Kenai Peninsula and Kodiak Island.

Our first concern is with the size of the area (approximately 500 miles by 130 miles). The area is so large and varied that it would be very difficult to develop the necessary information to make an environmental determination of the impacts created by exploration if the lease tracts are scattered throughout the proposed sale area. We recommend that the size of the proposed lease area be reduced so that the generic data will cover a less expansive area and present a more homogeneous sample of the conditions to be considered.

Our second concern is with the adequacy of the operating orders designed to protect this unique area, which is rich in renewable resources, and subject to severe weather, sea states and seismic activities. Our comments on the Proposed National Orders No. 2, 5, 7, 8 and 12 with appendixes are enclosed for your convenience.

Thank you for the opportunity to provide these comments.

Sincerely yours,

Joseph M. McCabe
Acting Director
Office of Federal Activities (A-104)

Enclosure

25 OCT 1977

COPY FOR YOUR INFORMATION

Russell C. Mayland
Acting Chief
Conservation Division
U.S. Geological Survey
Mail Stop 600
National Center
12201 Sunrise Valley Drive
Reston, Virginia 22092

Dear Mr. Mayland:

The U.S. Environmental Protection Agency has reviewed the Geological Survey's "Proposed National Orders for the Outer Continental Shelf Governing Oil and Gas Lease Operations" (proposed orders Nr. 2, 5, 7, 8 and 12 with Appendices) published in the Federal Register, August 25, 1977, vol. 42, No. 165. Our detailed comments are enclosed.

Our principal concerns are:

1. The fitness of Drilling and production units (bottom founded or floating) to drill in hazardous areas. Each portion of the OCS has particular hazards or combinations of hazards which make it unique. We believe the units fitness should be determined by comparing its design charastics against specific criteria (ie. stormwave height/period, wind velocity, tsunamis height, hurricane and earthquake forces) defined by and developed for these unique OCS areas. We further recommend that these criteria be established, published in the Federal Register and made a part of the Area Specific Appendices to the National Orders.

2. The exclusion from the orders of our authority under the Federal Water Pollution Control Act to regulate discharges from temporarily fixed Drilling/Protection units.

3. The absence of a statement concerning adherance to applicable Air Quality and performance standards which must be met under the Clean Air Act Amendments of 1977.

Thank you for the opportunity to comment on the proposed orders. If there are any further questions or comments, please contact Mr. George Turner, of my staff at 755-0770.

Sincerely yours,

Peter L. Cook
Acting Director
Office of Federal Activities (A-104)

Enclosure: EPA Detailed Comments on "Proposed National Orders for the Outer Continental Shelf Governing Oil and Gas lease Operations"

file: AMGS-A 0011 8-00
cc: Associate Reviewers

EPA Detailed Comments on "Proposed National Orders for the Outer Continental Shelf Governing Oil and Gas lease Operations"

National Order No. 2

Para 1.1.1 Seismic (including tsunamis)conditions should be inserted along with oceanographic and meteorological considerations.

National Order No. 5

Para. 4.1.7 Specifies the use of "closed sumps or sump piles". Sump piles should also be closed, not open to the ocean and the language of the paragraph should be changed to make this clear.

National Order No. 7

Para 1.1.1 and 1.2.1 In accordance with the "Development for Interim Final Effluent Limitations Guidelines and Proposed New Source Performance Standards for the Oil & Gas Extraction Point Source Category", EPA publication 440/1-76/055-A the effluent limitations - BPCTCA for drilling muds and drill cuttings require that "no discharge of free oil to the surface waters" result from the disposal of these materials. 1.1.1 and 1.2.1 of National Order No. 7 indicate that drilling muds and drill cuttings, sand and other well solids shall not be disposed of into the ocean unless the free oil has been removed. It is possible that under certain conditions, disposal of drilling muds and other solids from which the "free" oil has been removed could violate the effluent guidelines for disposal of these materials by creating free oil on the surface waters. We suggest that the wording of 1.1.1 and 1.2.1 be revised to be consistent with EPA's effluent guidelines. Section 1.1.5 - Fixed Structure Discharges - as amended can be used as an example of the propoer wording.

Para. 1.1.5 Fixed Structure Discharges. Because the Environmental Protection Agency has authority under the Federal Water Pollution Control Act to regulate discharges from temporaly fixed drilling vessels as well as drilling platforms, this section should be revised either by defining the term "fixed structure" to include temporarily fixed drilling facilities (such as vessels, jack-ups and semi-submersibles) or by inserting, in lieu of the word "fixed structure' wherever it appears in the paragraph the term "fixed or temporarily fixed drilling facilities".

Para. 1.1.6 Mobile Drilling Unit Discharges. For the reasons discussed above, this paragraph should be revised as follows: Marine sanitation devices for temporarily fixed drilling facilities shall meet Coast Guard Type I specifications.

Para. 1.1.3 Hydrocarbon Handling Equipment should be expanded to assure adherence to air quality and performance standards under the Clean Air Act Amendments of 1977.

National Order No. 7 (CMT)

Para. 2.3 Pollution Reports. All oil spills should be orally reported immediately. The establishment of a time limit depending upon estimated volume of materials spilt is not consistent with the intent of the spill reporting requirements contained in the Federal Water Pollution Control Act. Many oil spills which appear to be minor at first develop into major ones. Delay in reporting of spills precludes any timely action by Federal authorities for monitoring or cleanup efforts.

Para. 4 - Drills and Training - Drills and training classes with pollution control equipment and operational procedures, as required by this Section, are a positive step in reducing the impact of potential oil spills. However, we recommend that an additional paragraph be added to Section 4 stating that at least one supervisory individual on each offshore unit must receive formal oil spill control instruction and be so certified by the instructing institution. Several educational orgnaizations now offer oil spill control courses of the "hands on" type which would be beneficial to operating personnel.

Para. 3.1 Equipment. - "The use of chemicals shall be permitted only ...." should be changed to read" "The use of chemical agents or other additives shall be permited only ...." This will make language consistent with Annex X of the National Oil and Hazardous Substances Pollution Contingency Plan.

Para. 5 Spill Control and Removal - No policy requiring removal actions are stated in this paragraph. The policy of the United States requiring the removal of spill oil should be unequivocally stated. Also stated should be a preference for the use of mechanical removal methods, such as the use of sorbents, booms and skimmers over the use of chemical agents.

General Comment on the Appendices to the National Orders

The fitness of Drilling and production units (bottom founded or floating) must be consistent with the particular hazards of the specific area. To provide safety and Environmental Protection the fitness of a unit must be determined by comparing its design charastics against the probable hazards expected within the area of proposed operation. We urge that these specific criteria (ie. storm wave height/period, wind velocity, tsunamis height, hurricane and earthquake forces) be established, published in the Federal Register and made a part of the Area Specific Appendices to the National Orders.

We also recommend that an appendix be developed for offshore Northern Alaska, especially the Beaufort Sea Area.

Appendix I. Gulf of Mexico Area

OCS Order No. 5 Subsurface Safety Devices and Surface Safety Systems - Para. 2, Subsurface Safety Devices. Appendix I allows operators in the Gulf of Mexico to install subsurface controlled subsurface safety devices rather than surface controlled safety devices for wells with a shut in pressure of 4000 psi or greater. this is a unique exemption for the Gulf of Mexico and is unjustified in light of past poor performance of subsurface controlled devices (storm chokes) and their contribution, through poor performance, to serious pollution incidents from production platforms in the Gulf of Mexico. No exemption from surface controlled devices should be permitted except on special case-by-case basis where the use of the more reliable valves is completely precluded. reliable valves is completely precluded.

Appendix II. Pacific Area

OCS Order No. 2, Drilling Procedures and OCS Order No. 8, Platforms and Structures.

The OCS area of California is seismically active. OCS orders for mobile drilling platforms (such as jack up units) and permanent drilling and production structures should be designed to withstand earthquakes and other possible natural environmental phenomenon. Seismic design criteria should be part of the Operating Order Appendices for local seismic areas - specifically Appendix II for offshore California. Seismic design criteria for all types of structures are commonly applied in California and should be applied to those on the OCS.

Appendix III Gulf of Alaska

Comments stated on Appendix II apply even more strongly to Appendix III. This area is subject to very large earthquakes. The criteria stated in our General Comments should be included in Appendix III especially seismic and stormwave criteria. Until these specific criteria are developed for this hazardous area. We urge that the conditions contained in the present OCS Order No 2 be maintained. This will prohibit Jack-ups because of the hazards which earthquakes present to these units, and it restricts the use of drill ships on a case by case basis because of the wave conditions.

Appendix IV, V and VI

An analysis should be made to determine the need of design criteria for hazardous natural environmental phenomenon (specifically storm conditions). If the analysis determine that such criteria are needed for any of these areas, they should be included in the appropriate appendix.

SUBJECT: Review of Proposed Operating Orders for the Gulf of Alaska

DATE: 15 JAN 1976

FROM: Rebecca Hanmer, Acting Director
Office of Federal Activities (A-104)

TO: Steven Jellinek, Staff Director
Council on Environmental Quality

William Moffat, Director
Office of Policy Analysis, Department of Interior

Attached are EPA's specific comments on the latest draft of proposed operating orders for the Gulf of Alaska delivered to your office January 13, 1976. In the covering memorandum the Department of the Interior stated that virtually all of the comments made by EPA in its memo of January 8 had been incorporated.

U.S. Geological Survey has incorporated most of the specific comments made in our January 8 transmittal. These however, were, in most cases, recommendations intended to make requirements clearer or modify requirements that were clearly designed for the Gulf of Mexico conditions and had not been modified in the proposed orders as they were published in the Federal Register.

There were, however, three areas where EPA had a significant objection to the regulatory approach taken in the operating orders. EPA's recommendations were very similar to the recommended change in regulatory policy which was voiced in the Council on Environmental Quality's report to the President, OCS Oil and Gas - An Environmental Assessment. On two of the three major policy recommendations USGS took either no action or token action and action was only partially followed on our third recommendation.

Of most immediate concern to the position taken by EPA at the CEQ meeting of January 5, is operating order number 2 which deals with drilling including exploratory drilling which would be the only activity for the first two to four years after the lease sale. Environmental Protection Agency commented that due to the seismic and climatic conditions in the Gulf of Alaska any exploratory drilling rigs other than large semi-submersibles may present unacceptable environmental risks. EPA prefers that large semi-submersibles be the only type of rig permitted for exploratory drilling in the Gulf

of Alaska in the same way that exploration was conducted in the North Sea, but recommended that if others (jack-ups and drill ships) were permitted that a careful analysis of the worst case loadings from seismic and climatic conditions be made and compared to the capabilities of jack-up rigs and drill ships currently in use. From this analysis we recommended that specific areas where such rigs would be prohibited could be identified. USGS did not do this, but rather made very general restrictions for the use of jack-ups and drill ships which may permit their use in areas where they could be most susceptible to failure. (E.g., jack-up rigs are permitted in waters less than 200 ft. deep. While it may be technologically feasible to design shallow water jack-ups to withstand the earthquake forces to be expected in the NEGOA, rigs currently available have not been designed for such seismic conditions.)

The second area in which EPA expressed a fundamental difference in the approach taken by USGS was in the order (number 8) dealing with production platform design. In the original order only a general statement was made that platforms should be designed to withstand the seismic and environmental conditions found in the area of the lease. EPA recommended that the specific parameters to which the industry would be expected to design its platforms should be spelled out based on existing seismic and climatic data. In the absence of baseline data specific enough to make tract by tract requirements, EPA recommended that the worst case figures for the Gulf of Alaska area be used. In its latest order number 8 USGS has included specific design numbers for earthquake conditions, but has not included similar design values for storm and tsunamis conditions. Additionally, this office has some reservations about the validity of the design value used for earthquake conditions (these are discussed in more detail in the specific comments).

Finally, EPA objected to the tack taken by USGS to regulate simultaneous operations on production platforms (producing, drilling, workover, wirelining, construction, etc.) such operations are often done by a contractor which can cause a lack of good general supervision and generally an increase in unrelated activities occurring on a limited platform space. USGS proposed that each operator submit a plan outlining general policy to be followed whenever simultaneous operations are conducted. The plan would then be reviewed by the USGS area supervisor. EPA recommended that either simultaneous operations be banned or that USGS analyze each operation and its hazards and specifically spell out which could take place in a safe and compatible manner. No meaningful change was made to this portion of order number 8.

In addition to the above changes which EPA requested to the orders as proposed January 6, 1975, a new and disturbing question is raised by some of the wording in the most recent draft. Many of the requirements for platform design carry the qualifier that they

shall apply only to those platforms built after the effective date of the order. No platforms are currently being built and none are contemplated for two to four years. Since the qualifiers were only added in the most recent draft the question has to be asked what was the purpose? Unless USGS doesn't plan for the orders to become effective for several years the qualifier is pointless. If on the other hand USGS plans for the orders to become effective two or more years from now, why are they contemplating exempting the earlier platforms? From an environmental review standpoint this could be a very important point making useless the employment of the operating orders as a description of the project.

Conclusions

1. While some of EPA's comments of January 8 have been incorporated into the revised orders, for the reasons stated above and in the specific comments, EPA must conclude that the revised operating orders are generally unresponsive to EPA's recommendations of January 8.

2. Serious questions are raised concerning the intended effective date of the orders and the purpose for any contemplated delay in the effective date.

Recommendations

The most time consuming portion of the changes that EPA is requesting Interior to make would be the analysis required to revise order number 2. That, however, should not require more than one to two months plus the time necessary to promulgate the order, making the total delay two to four months depending upon whether the orders would have to be reissued as proposed orders before final promulgation. Additionally, the same analysis would provide much of the missing information required to make the revisions to order number 8 which EPA believes are necessary. Consequently the difference in time delays between the options of issuing just order number 2 prior to the lease sale and issuing orders 2, 7 and 8 prior to the lease sale is probably very small.

We recommend that orders 2, 7 and 8 be published in final form acceptable to EPA prior to the lease sale. As noted earlier Interior should also commit itself to a schedule for the development of area specific orders and an additional environmental review (EIS or Environmental Assessment acceptable to EPA) prior to the development phase.

Attachment

SPECIFIC COMMENTS ON PROPOSED OPERATING ORDERS
FOR THE GULF OF ALASKA

Order Number 2

P2-2 EPA in its comments suggested that Order #2 be changed to recognize that all types of exploratory drilling rigs may not be environmentally suitable for Gulf of Alaska conditions. We suggested that either drillships and jack-up rigs be prohibited or that stringent requirements be placed on them based on the seismic and environmental conditions found in the Gulf of Alaska.

In response, the revised order prohibits jack-ups in waters greater than 200 feet and permits drillships if they are equipped with motion compensation equipment and are capable of being maneuvered into a storm without pulling anchor. We do not think this is an adequate treatment of the potential seismic and environmental conditions. The restriction on jack-ups in water over 200 feet in depth is obviously an attempt to compensate for some seismically induced ground movements and storm conditions. As pointed out in the CEQ study (Volume 3) tsunamis waves increase in height as they near shore. Since the shallower waters in which jack-ups are permitted are generally closer to shore, there may be some cases where the rigs will be permitted which are susceptible to tsunamis waves beyond the capabilities of the rigs. Also, the 200 feet generalized limitation doesn't take into consideration the possibility that some of the areas may experience more severe climatically induced wave heights than others. Most important, however, is the fact that while the design of jack-ups to withstand seismic conditions of the NEGOA is technologically feasible for shallow waters, exploratory drilling would realistically be done with existing rigs which have not been designed to withstand such seismic forces even in shallow water. The criteria for jack-ups should be more specific. (Eg. specific criteria such as are found in order #8 for production platforms could be applied.)

Simiarly, the criteria for drillships should be more specific. Motion compensation equipment only compensates for vertical motion. The only experience with drilling in the Gulf of Alaska was with a drillship. The ship was intended to drill a hole some 15,000 feet, but was only able to drill to 5,000 feet due to continuing storm conditions. There should be specific criteria for the requirement that ships be able to maneuver into a storm without pulling anchor.

The experience in the North Sea also dictated a change in exploratory drilling technology. The larger semi-submersibles which EPA is recommending were developed in response to the belief that drill ships would not be sufficiently stable to insure safe drilling practices under North Sea storm conditions. Few, if any, exploratory wells were drilled in the North Sea with drillships.

Order Number 5

EPA's comment on the method of control for subsurface safety devices on injection wells was not incorporated. The reason is unclear as this is simply a clarifying comment.

Order Number 6

EPA's comments were adequately incorporated .

Order Number 7

P7-2 EPA's comment that the statement, "Drilling mud containing toxic substances shall be neutralized prior to disposal" should not be made without giving criteria for neutralizing expected toxic substances. The reason for this is unclear since it was our understanding that this statement would be changed to require that disposal shall be in accordance with an EPA section 402 permit.

P7-6 "No chemicals shall be used without prior approval of the Area Supervisor." EPA pointed out that this statement was inconsistant with the National Contingency Plan, which gives the On-Scene Coordinator - in this case the representative of the USGS - the authority to use chemicals only in cases of extreme danger to life or property. The Contingency Plan also states a policy supporting the use of mechanical methods of clean-up wherever possible. The way the statement is worded a much less restrictive policy is implied.

Order Number 8

Many of the requirements for platform design are qualified by a statement exempting facilities built prior to the effective date of the order. Since this is new language and not a carryover from previous orders or the proposed order published January 6, 1975, the purpose of the qualifier is questioned. Since no platforms should be built for several years in the area covered by the order the point should be moot.

P8-3 Specific design requirements are given on page 8-4 for seismically induced ground movements. Similarly specific requirements should be given for storm and tsunamis conditions. The government rather than the industry should determine the design storm conditions which have a ninty-nine per cent chance of not being exceeded.

P8-4 The criteria which the industry should use to calculate ground displacements from ground accelerations should be given. EPA is aware of two such standards. USGS Circular 672-1972- Ground Motion for Alaska Pipeline requires time history data which are not available in this case, so the generally more severe USAEC Design Response Spectra for Size and Design of Nuclear Power Plants (Dec 1973) should be specified. This circular permits calculations for both horizontal and vertical components by ground displacements and thus the requirement for assuming vertical displacement to be 2/3 of horizontal displacement is unnecessary.

P8-4 (second page 8-4) 4(f) This section should give more specific guidelines as to the types of equipment which should be given extra protection and some guidelines as to the level of extra protection should be given.

P8-7 The reasoning behind the failure to require that the operator submit the critical design loadings, etc., is not clear.

P8-10 No intrafacility piping requirement similar to API RP 14E have been incorporated into the order as recommended by EPA.

P8-21 EPA's objection to open-ended sumps has not been incorporated.

P8-24 EPA's recommendation that criteria for the operation of motion sensing devices be established has not been incorporated.

P8-25 EPA's recommendation that specific criteria be established for simultaneous operations has not been incorporated.

Order Number 9

No order number 9 was presented. In the absence of any memorandum of understanding between DOI and DOT, and in the absence of any DOT regulation covering submarine pipelines, EPA believes that it is premature to drop order number 9.

EPA Comments on Draft USGS Operating Orders for the Gulf of Alaska

Rebecca Hanmer, Acting Director 8 - JAN 1976
Office of Federal Activities

Steven Jellinek, Council on Environmental Quality

William Moffat, Department of the Interior

Enclosed are EPA's comments on the draft operating orders for the Gulf of Alaska (Orders 2, 5, 6, 7, 8, and 9).

It is our opinion that those orders should be promulgated in final form prior to the lease sale.

Our recommendations for further environmental review are also enclosed.

Enclosure

JCunningham:TCharlton:rr 1/8/76

OCS OPERATING ORDER NO. 2

Exploratory Drilling Units:

Environmental hazards (storm waves, wind, tsunamis and earthquakes) in the Gulf of Alaska may present unacceptable threats to the rigs used for drilling exploratory wells.

Earthquakes and, possibly tsunamis, will be most hazardous to jack up (bottom founded) units. Storm waves and tsunamis will present the greatest hazard to drillships (floating units). Semi-submersible (floating) units are the least likely to be threatened by environmental hazards.

EPA believes that Operating Order No. 2 should be written to consider the hazards that environmental forces pose to these types of drilling units, and suggests the following approach.

1. Either prohibit the use of drillships and jack up units and only allow the use of semi-submersible rigs; or,

2. Provide an analysis of the ability of existing rigs of the jack up and drillship type to withstand their respective limiting hazardous conditions (earthquakes (accelerations, displacements and velocities), tsunami and storm wave (heights)). Couple this with an analysis of where these limiting conditions are likely to be met in the Gulf of Alaska and prohibit the use of the units where these conditions are likely to be met or exceeded.

Data published in the Environmental Impact Statement, the CEQ Study on the OCS and data already published by NOAA should be used in predicting limiting environmental conditions.

OCS OPERATING ORDER NO. 5

1. Paragraph 1.B. Injection Wells. The method of control, whether surface, subsurface or some other, is not specified for subsurface safety devices for injection wells.

2. Paragraph 2.A.(1) provides that the operator shall comply with the minimum standards set forth in API Spec. 14A, October 1973, but fails to make any mention of who will make a determination of the class of valve service that will govern.

3. Paragraph 5. Emergency Action. The following phrase should be added to the first sentence "...and shall not be left unattended while open to production."

4. Paragraph 7. Reports. A separate OCS order should be written establishing a failure reporting system along with detailed reporting requirements for the operation of this system.

F-BLM-A02080-AK

OCS OPERATING ORDER . 6

No mention is made of storm chokes as has been done in Order No. 6 for the Gulf of Mexico and the Pacific Region. We believe that these should be required for oil and gas wells capable of flowing. Part 3.B. does not contain any provision for a temperature or cement bond log in tubingless completion wells where lost circulation or other unusual circumstances occur during the cementing operations. How will this eventuality be covered?

OCS OPERATING ORDER NO. 7

1. Section A, Liquid Disposal, gives instructions for disposal of various classes of liquid wastes. This section should be changed to say that all such wastes (produced water, sanitary wastes, drill cuttings and muds) are subject to section 402 permits issued by the EPA Region X office. Each permit will be site specific and issued on a case-by-case basis.

2. Paragraph 1.B.(2) should make it abundantly clear that all solid waste material generated during development and production will be incinerated or transported to shore for disposal. Since sewage disposal systems are by water carriage it is recommended that B-(3) and related subparts be placed under liquid disposal.

3. Paragraph 2.B.(1). Operators may delay reports of oil spills of less than 15 barrels (630 gallons) up to 12 hours. This will effectively preclude any Federal cleanup response. In contrast to the National Contingency Plan and considering the value and sensitivity of Alaskan biota, the sections on Pollution Reports and Control and Removal are written with a philosophy which appears to disregard oil as a pollutant.

This section should be made much more stringent with reporting and cleanup criteria similar to the appropriate portions of Section 311 of the FWPCA.

OCS OPERATING ORDER NO. 8

Order No. 8 contains no requirements other than very general requirements for the seismic or wave induced stresses which platforms in the Gulf of Alaska will have to withstand.

Section 1.A (1), General Design, should set forth the design parameters (such as seismic induced accelerations, velocities and displacements and wave heights) which the platforms must be designed to withstand. These parameters should be developed from the climatic and seismic data in the Environmental Impact Statement, the CEQ Study, and the data currently available from the NOAA study.

Section 1.B (2), (3) and (4), application requirements for environmental information, foundations, and design features, which require submittals by the applicant, should reflect the design requirements of Section 1.A (1).

Submittals under the application Section 1.B. should be contained in the development plan and reviewed at the time of the development plan submittal.

Section 1.C, Certification, should contain the requirements for third party inspection of the structure design as proposed by the USGS.

Operating Order No. 8 contains no requirements for platform piping.

Section 1.D, Design Features of Production Facilities, should contain requirements for platform piping. API RP 14E could be used as the basis for platform piping in the same way that RP 14C is used as the basis for safety system requirements. Alternatively USGS could develop their own piping requirements.

Section 2.A (3), Other Equipment, contains a requirement for motion sensing devices, but no criteria for their performance. Performance criteria should be included in the order and how the motion sensing devices are to be used to sequence shut down should also be included. Section 2.A, Safety and Pollution Control Equipment and Procedures may be a more appropriate section of the Order for the inclusion of these devices.

Paragraph 2(5). Curbs, Gutters and Drains. The use of open end sumps and sump piles should be discontinued. Where closed sumps are used and liquids are removed by pump, a second or standby transfer pump should be provided.

Paragraph 2.B. Simultaneous Operations. The Environmental Protection Agency has voiced its concern to the USGS in the past regarding the practice of allowing multiple operations to take place simultaneously on offshore platforms (drilling, production and/or completion-workover). Not only does this practice multiply the number of operations taking place in a small area thus increasing the chance of accidents, but since many of these operations are performed by contractors there may be a deficiency in overall supervision and management of platform operations. The proposed Order simply requires the operator to develop a "plan". Guidance for the planning of simultaneous operations needs to be substantially improved.

The USGS should examine each individual operation and the particular hazard that it imposes on platform and develop operati orders which allow only those operations to take place which are compatible and safe. Alternatively, the USGS could simply prohibit multiple operations taking place on OCS platforms.

OCS ORDER NO. 9

It is the understanding of the EPA that OCS Order No. 9 will be replaced by expanded regulations to be issued by the Office of Pipeline Safety, DOT.

This leaves the status of Order No. 9 for the Gulf of Alaska uncertain. The following EPA comments on proposed Order No. 9 should be incorporated either in the order or the regulation which replaces it.

While there is an obvious attempt at compatibility between DOT regulations and the proposed OCS order, several areas of incompatibility remain.

For example, in defining levels of internal pressure (both operating and test pressures), the proposed OCS Order produces a new set of terms and definitions. It would appear to be desirable to limit the proliferation of new language in pipeline regulations, since some of it seems to be unnecessary. DOI should coordinate with DOT to produce a standardized set of terms and definitions to be used in all pipeline regulations issued by the respective agencies.

The requirements presented in the DOT regulations are stated to be minimum design requirements. In some cases stress levels must be reduced over the nominal values listed. For example, external loads on pieplines may induce stresses which will combine with the stress caused by internal pressure. In this case, the internal pressure must be reduced so that the combined stress does not exceed the allowable values given in the regulation. The proposed Operating Order only addresses those stresses induced by internal pressure. The Order should be changed to indicate that this is a minimum requirement and that reduction from the stress levels given may be required where construction or operating conditions or other loadings on the pipe are such that combined stresses should be considered.

Additionally, the Order should set any requirements for valves and fittings. These are an integral part of a pipeline and should be included in the definition of "pipeline."

The Order should also specify requirements for non-destructive testing of field welds. The Order should set requirements for x-ray examination or other non-destructive testing of girth welds.

Where a pipeline is to be installed on the ocean floor, guidance should be given for weighting or ballasting the pipe.

1. Paragraph 1.A. Platform piping has been excluded from the proposed order. If this pi g is to be excluded, it should ' covered by an industrial or other code appropriate for required leve.s of safety and pollution prevention.

2. Paragraph 2.D.(1). The period of the hydrostatic test should be increased to 24 hours--the period used by DOT for testing liquid lines (49 CFR Part 195 Section 195.302).

3. Paragraph 2.E.(1). The dimensions given for depth of burial should indicate the minimum amount of cover over the pipe.

In addition, EPA believes that the order or regulation should contain a requirement for a leak detection and monitoring system, based on pressure sensing, metering and volume balance parameters similar to that developed for the Trans Alaska Pipeline. Such a system is technologically feasible and would replace or supplement a visual system which, considering weather conditions and sea state in the Gulf of Alaska, would be very unreliable.

ADDITIONAL ENVIRONMENTAL REVIEW

Ideally all operating orders should be completely revamped as they deal with field development for production. As stated in the CEQ study of OCS development the regulatory concept used in areas of prior OCS activities is inadequate for the unique climactic, seismic, and other environmental conditions found in the Gulf of Alaska. The orders, as they relate to field development, should be rewritten as detailed performance requirements for the conditions described in the general order No. 8 which EPA believes should be promulgated prior to leasing.

While we believe that the employment of a third party expert to review platform designs is a sound concept, it cannot replace the kind of detailed written requirements that CEQ recommended in the April, 1974 report to the President and that EPA believes are necessary for the Gulf of Alaska conditions. In order to effectively review designs the third party will have to have available the design criteria to which the government expects the industry to conform. The development of such criteria will require a detailed review of the state-of-the-art in offshore design and will require a substantial amount of time to complete. As development will not commence until four or more years after the sale, time is available to develop adequate design criteria.

From an environmental review standpoint such design criteria are the core of the description of the project and should be an essential part of the impact analysis. Such information is not now available and thus the pre-leasing EIS does not suffice as a review of development of oil and gas leases. Therefore, prior to the lease sale, EPA believes Interior should commit itself to a time schedule for the development of design criteria and to providing an additional environmental review prior to proceeding with development. This could be either a commitment to preparing a formal EIS for the development phase or to prepare an environmental assessment (with opportunity for EPA and State review) prior to development. In either case EPA will evaluate the impact of lease development, revised operating orders, and other methodologies such as spill trajectory analysis, as such data become available, and would welcome the opportunity for a formal interagency cooperative agreement.

2. State of Alaska responses - March 2, 1979:

a. Mark Stephens, Alaska Department of Community and Regional Affairs:

"Yakutat's probably been just about studied and meeting'd to death over the past several years. As I said, again, through informal channels. . . we have attempted to bring to BLM's attention some of the things that our department has been involved in directly or indirectly. In the region I think there's some work that we've conducted that would probably be of relevance and assistance to BLM in carrying out their impact statement.

A strictly personal perspective, I am really in 100 percent agreement with CEQ's direction in narrowing down the EIS to really a document of relevant decision information as opposed to an encyclopedic compilation of all the data that one could possibly gather. . . .

Another thing I again just bring to your attention for informational purposes, and I'm sure you have some awareness of it already, is our role in the State Coastal Zone Management Program is to provide financial and technical assistance to local governments in assisting them in carrying out their responsibilities, and so at this point in time they're probably two things that you want to be concerned with:

(1) The State program has a statute and regulations which are in effect, and the so-called Federal consistency provisions haven't come into play yet because the State program hasn't been approved by the Federal government, but nonetheless the State does have a program with some evolving structure. I'm sure you would want to inform yourselves about that as you have people working on it already, and to just take those considerations into account.

(2) The other component that you'd probably be concerned with is the status of the local planning efforts. To date in the coastal management arena Yakutat has not done much. As I said, they have had a lot of work done on comprehensive planning, socioeconomic studies, and some other areas, but I think it's quite conceivable that over the coming months they will undertake an effort to comply with the provisions of the state statute. Cordova has an ongoing program. I don't know if this effort may touch upon other Southeastern communities, but Haines and Juneau and Sitka all have ongoing programs. We expect that Skagway will probably have a planning effort in the near future. That probably just about covers the major communities that would receive any sort of direct impacts. Of course, we would have to see what kind of scenarios were developed and what kind of indirect effects might be projected."

b. Jerry Kreitner:

The following remarks were not recorded. Written comments will be submitted.

Mr. Kreitner felt that Seward or Whittier may be areas that are impacted more heavily than Yakutat. Areas that have access to transportation from supply areas such as Anchorage for distribution--Seward in particular. If this one runs like the last, it will be those areas that are affected and not so much Yakutat. Yakutat would be affected later on, of course, if something is found.

c. Jay Bergstrand, Alaska Department of Transportation:

The following remarks were not recorded.

Mr. Bergstrand's department just completed a draft study on a Prince William Sound transportation system, which OCS might want to keep on the alert for.

Comment by Paul Gates to Jay Bergstrand: The Department of the Interior has reviewed the study and submitted comments back to the State. Copies of those comments have been provided to the OCS Office.

ALASKA OCS OFFICE
ANCHORAGE, ALASKA
MAR 28 8 26 AM '79

STATE OF ALASKA

JAY S. HAMMOND
GOVERNOR

OFFICE OF THE GOVERNOR

DIVISION OF POLICY DEVELOPMENT AND PLANNING

POUCH AD–JUNEAU 99811
PHONE 465-3577

March 23, 1979

Mr. Henry Noldan, Acting Manager
Alaska OCS Office
P.O. Box 1159
Anchorage, Alaska 99510

Dear Mr. Noldan:

We appreciate your having called a scoping meeting earlier this month to discuss the forthcoming environmental statement on oil and gas lease sale #55 in the Gulf of Alaska. Despite the low turnout of state people at the meeting, the scoping concept is one that we endorse.

The purpose of this letter is to share some concerns with you so that you can deal with them in preparation of the statement.

First, we request that you carefully describe the present state of knowledge and proposed mitigating measures for the concerns identified in our August 4, 1978 letter to Mr. Frank Gregg. That letter was in response to the call for nominations on this sale.

Second, and more generally, we urge you to orient your EIS in a manner that satisfactorily answers the enclosed project evaluation factors. Adequate dealing with these factors has proven essential in order for the state to make an informed judgment on activities such as the one you propose.

Sincerely,

Jerry L. Madden
State-Federal Coordinator

Project Evaluation Factors

Economic

1. What changes would be generated in real per capita personal income for current resident Alaskans over the life of the project (construction and operational phases)?

2. What are the employment and population changes expected to result from the project?

   a. What proportion of jobs are expected to be occupied by current Alaskans?

   b. What are the characteristics of these jobs (seasonality, skill level, occupational category, short-term, long-term)?

3. Does the project contribute to long-run economic stability? What short or long-term price effects are expected to result from the project?

4. What administrative roadblocks exist which would affect the economic feasibility of a project?

Community Well-Being

1. What changes are expected in the quality, availability, or demand for governmental goods, services or facilities?

2. Are changes in housing conditions expected (e.g., availability, price, quality)?

3. What local population changes are expected (e.g., amount and rate of change, characteristics of expected in-migrants)? Are population changes expected to cause significant value or lifestyle conflicts? Is displacement from traditional occupations expected?

4. Do adequate local growth management capabilities (land use plans, ordinances, revenue-generating mechanisms) exist?

5. What is public sentiment (local and statewide) toward the proposed project?

Fiscal

1. What effect would the project have on the net balance of state and local expenditures versus revenues over time?

2. Are there explicit or implicit state subsidies associated with the project? If so, what is the extent of such subsidies?

Resource Utilization

1. What effect will the project have on resource industry potentials or other resource values? Will the project result in irreversible resource commitments?

2. Will the project affect fish and wildlife populations or their habitat? Will these effects be short-term or long-term in nature?

3. Will the project affect subsistence resources? For example, are changes in migration patterns, loss of species, dislocation, or availability changes expected?

4. Will the project affect designated or specifically defined wilderness, historic, watershed, recreational or scenic areas?

Environmental Quality

1. What are the anticipated effects of the project on the environmental health or safety of the populace?

2. What are the provisions for environmental monitoring, surveillance, and quality control?

Risk

1. Does the project involve technological, environmental, financial, or economic factors which have a high degree of uncertainty or risk?

2. To what extent is the existing data base adequate to answer the above questions?

3. Are there external factors (e.g., national or international) which figure prominently in the success or failure of the project?

Alternatives

1. Are there economically feasible and socially acceptable alternatives for accomplishing the objectives of the project?

2. What would be the implications of non-approval of the project?

Miscellaneous

1. Is the proposed project or action compatible with local and state plans or policies?

2. What permits, licenses and/or governmental (state, local and/or federal) approvals are necessary?

3. What is the timetable for various stages of the project? How flexible is this schedule?

4. What mitigation measures or stipulations can be identified to minimize the conflicts or problems identified above?

STATE OF ALASKA

JAY S. HAMMOND
GOVERNOR

OFFICE OF THE GOVERNOR

STATE POLICY DEVELOPMENT AND PLANNING

POUCH AD—JUNEAU 99811
PHONE 465-3512

August 4, 1978

Mr. Frank Gregg, Director
Bureau of Land Management
Attention: 720
Department of the Interior
Washington, D. C. 20240

Dear Mr. Gregg:

Our interest in prudent OCS development in the Gulf of Alaska region has resulted in the production, with the assistance of the national Coastal Zone Management program, of the recent book: Planning for Offshore Oil Development, Gulf of Alaska OCS Handbook. This summarizes the natural and human environment of the Gulf, in the context of potential oil and gas development.

The State's view of a second OCS Sale (#55) in the northern Gulf of Alaska is essentially unchanged from our position on the original sale (#39) of two years ago. The lack of oil discovery in the original lease area and the lack of a technology to adequately cope with oil spills under the rugged conditions of the Gulf of Alaska persist. On the positive side, the intensive research of the Outer Continental Shelf Environmental Assessment Program conducted by the Bureau of Land Management and the National Oceanic and Atmospheric Agency has now produced excellent information -- virtually all of which reinforces earlier State concerns about leasing in the Gulf of Alaska. The area of call for Sale #55, considerably expanded from the previous sale, covers a 400-mile stretch of continental shelf with tremendous fisheries and wildlife values, particular geologic and meteorologic hazards to development and no industrial infrastructure.

There are a number of specific concerns raised by State personnel on the northern Gulf area of call:

1. Environmental Quality - The northern Gulf of Alaska has a tremendous resident and seasonal population of marine mammals, sea and shore birds and commercially important stocks of salmon, halibut, crab, shrimp and scallops, all of which are dependent upon the area's extremely

high environmental quality. The occurence and sensitivity of these populations to OCS-related pollution are exhaustively reviewed in the enclosed materials prepared by the Alaska Department of Fish and Game. Of particular interest are two sets of charts, one summarizing all major physical, chemical and biological processes by season for the northern Gulf, the other graphically locating the major fisheries and bird and mammal colonies. This material was drawn heavily from the excellent reconnaissance and baseline research studies conducted in the Gulf by the National Oceanic and Atmospheric Agency under the sponsorship of the Bureau of Land Management. These studies were initiated in 1974 and 1975, and little information was available before the previous sale. Now, with a much improved data base, a far more objective cost-benefit analysis of the proposed sale is possible. Aside from improved biological information, we have for the first time a good series of physical models of offshore water circulation and possible spill trajectories, tested against both current meters and satellite-monitored drogues. This information makes it clear that -- as suggested by qualitative conclusions in the past -- there is a complex westward drift throughout the northern Gulf, with a high probability of shore impact from offshore activities. Curiously enough, several drifting, satellite-tracked buoys released in the offshore current east of Kayak Island eventually moved through Hinchinbrook Entrance into Prince William Sound, a particularly beautiful and vulnerable area. It is also important to note that OCS studies, including the previous Environmental Impact Statement, covered only the area from Yakutat Bay to Middleton Island. In the east, there is a major fishing area, the Fairweather Ground, which has not received study.

2. Geologic Hazards - The western section of the area of call, west of Middleton Island, is the region most strongly deformed during the 1964 Good Friday Quake. The call boundary closely parallels the axis of major uplift from that seismic event, and, within the proposed leasing boundary, there are individual faulted blocks of sea floor which had as much as 42 feet of vertical movement at the time of the quake (see attached Figure 1, from The Great Alaska Earthquake of 1964, National Academy of Science, 1972). In the sector of the call area between Montague and Middleton Island, there is a jumble of faults, any of which can be regarded as active. Also in the west, in the area off the Copper River Delta, there are large bodies of unconsolidated sea floor sediments with a high potential for earthquake-related subsidence or slides which could severely damage offshore platforms or pipelines. To the east, there are two areas now included for consideration which may contain unstable, slide-prone sediments: Yakutat Sea Valley and Alsek Canyon, seaward of Dry Bay. A major active transcurrent fault zone, the Fairweather, parallels the shore in this region. Both sizeable quakes and tsunamis have occurred here during historic times. We understand that seismic monitoring of the entire northern Gulf has been considerably expanded under the OCS research program, but detailed studies of seafloor faulting and unstable sediments have not been conducted in either the eastern or western ends of the call area. It is also our understanding that there have been few observations of strong

quake motions or acceleration on the OCS, the critical input in the design of quake resistant structure. Such research should be available before stipulations are made for another northern Gulf sale.

3. Other Concerns - The portion of the area of call west of the presently leased region has very high esthetic value. This area, particularly Montague and Hinchinbrook Islands, has been identified in studies by the Federal-State Land Use Planning Commission as possessing unusual scenic and wilderness qualities. These same qualities are cited in the Division of Parks publication, Recreation, Scenic and Heritage Areas of Particular Concern, Cape Puget to Cape Suckling, Alaska. Fort Constantine, the first permanent outpost (c. 1795) of the Russian American Company, is an historical-archaeological site on Hinchinbrook Island. The outer coast of Montague, which has superb wilderness qualities and some of the finest beachcombing in Prince William Sound, would be as close as three miles to the proposed leases. This degree of proximity could destroy the wilderness character of the Montague beaches, and impair scenic qualities as oil drilling and production activities would be highly visible. In addition, the same current and wave patterns that make Montague's outer beaches so fine for beachcombing would funnel drilling mud, oil and production debris onto them.

On the basis of our concerns, we would like to make two specific recommendations to BLM with respect to further OCS sales in the northern Gulf of Alaska:

1. We recommend that the entire section of the call area west of Kayak Island be deleted from the sale. This section has an extremely rich diverse biota, important for commercial fisheries, subsistence, and recreation uses. If this area remains open, we recommend that the section facing the Copper River delta, from Kayak Island to Hinchinbrook Entrance, be developed only under the strictest environmental surveillance, with enforced stipulations to minimize seasonal problems with shorebird and waterfowl migrations, salmon and shellfish spawning and rearing and commercial fishing operations. The region west and north of Middleton Island, severely disturbed at the time of the 1964 quakes should not be opened for development until intensive geophysical and geologic studies have fully defined the specific hazards of the region.

2. In the remainder of the expanded call area, west of the presently leased area, we recommend deletion of all tracts shoreward of the 175 fathom isobath to minimize conflicts with commercial fisheries operations and impacts to the beaches and rich coastal lagoons of the shoreline. If development is necessary, comprehensive reconnaissance and ecosystems studies should be conducted on the offshore fishing grounds and in the lagoons in order to plan an adequate regulatory strategy to reduce harmful impacts before development proceeds.

Thank you for the opportunity to comment on the proposed northern Gulf of Alaska sale. I hope our information will be of use.

Sincerely,

Jerry L. Madden
State-Federal Coordinator

JLM:jp

cc: Assistant Conservation Manager, USGS
Manager, Alaska OCS Office, BLM
Commissioner R. LeResche, Dept. Natural Resources
Commissioner R. Skoog, Dept. Fish and Game
Commissioner E. Mueller, Dept. Environmental Conservation
Commissioner L. McAnerney, Dept. Community & Regional Affairs
Rick Wright, Policy Development & Planning
Attorney General Avrum Gross, Dept. of Law
Commissioner D. Harris, Dept. of Transportation & Public Facilities
Commissioner P. Hubbard, Dept. of Commerce & Economic Development
Commissioner S. Gallagher, Dept. of Revenue
Murray Walsh, Coordinator, Office of Coastal Management

Enclosures

3. Responses from Public Meeting - March 27, 1979:

a. Pat Wunnikins:

The possibility of foreign tankers as a result of the oil glut could pose an additional threat to the area. A "connected action" is that industry does not have the ability to process the oil. Opening a new field creates new problems with an oil glut.

Wave transport of spills. Along shore transport, mixing with the beach sediments, contamination of the coastline - no work has been done in the OCSEAP studies on waves or along shore transport.

The inability to protect the system in the event of an oil spill. Coping with a spill on the coastline and in the open sea. Cannot protect the environment if there is a spill. Clean up technology is a marginal way to protect the system.

b. Virginia Harris:

Wave height and velocity. Concerned about the extrapolation of California information in the Sale #39 EIS.

Marine mammals.

Fisheries of all kinds.

Sea birds of all kinds.

Migratory birds.

Oil clean up during a storm, especially from tankers.

Socioeconomic impact on such communities as Yakutat. "They will be the losers." Taxes go so much higher because of the increase in services required. The perceived economic base is only temporary.

Referral No. 3312

ALASKA OCS OFFICE
ANCHORAGE, ALASKA
MAR 23 9 09 AM '79

March 21, 1979

Greenpeace Alaska
551 L Street
Anchorage, Alaska 99502

United States Department of the Interior
Alaska Outer Continental Shelf Office
Post Office Box 1159
Anchorage, Alaska 99510

Dear Sir,

A-Action

Greenpeace Alaska would like to add our comments on the lease sale No. 55 by Yakatak.

We hope that the development will take into consideration the fact that these waters are the traditional migratory routes of the gray whales. We hope that exploration and drilling activities would be suspended during the months when thousands of whales travel the coastal waters. This happens twice a year. All of April, and the first part of May, and the month of November are the times we feel are crucial and sensitive to the survival of the species.

Thank you for this opportunity.

Sincerely,

ORO briscoe

Oro Briscoe
Executive Director
Greenpeace Alaska

OB/ps

Form 1541–3
(July 1965)
(formerly 4–1599 a)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

CONFIRMATION/REPORT OF TELEPHONE CONVERSATION

TO	Name: Henninger	FROM	Name: Jim Slocum, - general public
	Office		Office
	Location		Location
	Telephone Number		Telephone Number

Purpose of Call: Scoping - Broposal # 55 = Guld of Alaska

Jim called to express opinions on topics for ~~x~~ the DEIS for #55. He was at the general scoping meeting last night, but had to leave and was unable to comment.

His concerns were for estuarine ecology in general, and more particularly the siting of shore based operations is estuarine areas. He has seen such areas abused in other states as well as Alaska, and felt this was a highly significant issue for the EIS. After some discussion, he ~~expressed~~ put his concerns ~~in~~ in the broader ocntext of coastal zone management, land use (planning), zoning, etc.

I thanked him for his attendance at the meeting, and his ~~x~~ call.

Explanatory Remarks:

He felt the meeting was a particular success, in that he learned much about the new CEQ process in general, and scoping in particular.

3/28/78 (Date)

D E Henninger (Signature)

CONFIRMATION COPY

PUBLIC MEETING

March 29, 1979

City Offices
Yakutat, Alaska

SUBJECT: Public Comments on the Proposed Oil and Gas Lease Sale No. 55, Gulf of Alaska

ATTENDEES: Ron Ball, Game Biologist
Homer Ogle, Jr., Fisherman
Neva Ogle, Banking
Dorothy B. Henry, Teacher
Gerald S. Pond, Fisherman
Larry E. Powell, Mayor
Caroline Powell, Self-employed
Bob Anderson, Fisherman
Wink Hastings, Alaska OCS Office
Elaine Pratt, Alaska OCS Office

Larry Powell: A comment to various contractors working on various portions of Southeast studies being developed for the DEIS would be that those people try to have as much interaction with the community as possible. Other areas of the state will be affected as well, but Yakutat is the population center, the only place that is really going to feel the majority of the activity. Oil companies have told them they will operate out of Yakutat. Contractors drafting the Southeast comments should be getting into Yakutat, talk with the people to compile the segments making up the whole.

Caroline Powell: Yakutat should be singled out in the Southeast studies. In the previous sale, Yakutat shared impacts in the EIS with Cordova, Seward, etc. Because this sale holds a good chance (Yakutat having 95% of the impacts) they would like to feel that the impact studies would address Yakutat in the same percentage they will be impacted from the sale. They would then have something to respond to.

Bob Anderson: Was the coordinator for all five oil companies at the height of Sale 39. Did not feel that the community's comments were listened to in Sale 39. The scale of 55 is "almost staggering" for Yakutat. The subsistence issue will be drastically affected, will be the No. 1 priority. Could cripple them because of the fisheries. It would not only shut off the commercial and sport fishing, but whatever resources would be used for subsistence because of the number of people that would get into the resources through subsistence.

Because of escalation in prices in Yakutat, subsistence has been first and to some extent becoming a greater need. If the escalation continues, the affect on the resources will be escalated. Fish are schooled right off Yakutat.

Replenishment for lost gear by the government: Runs are selective and peak. A fisherman with ruined gear cannot get new gear immediately. With a three-day run, a fisherman will lose the whole run if his gear is damaged on the first day. They have to order gear a year ahead. Compensation of $5,000 for lost gear does not compensate for the loss of a $20,000 run.

Caroline Powell: There should be emphasis on fishing as much as on fish species so that the answer is not replacing the gear, but planning how to best avoid the situation.

Larry Powell: The crux of the problem is to have the investigators deal directly with the fishermen, regardless of who they are. Find out the locations, when they work it, their movements, and work out specific alternatives such as routes for supply boats circumventing areas where the fishermen will be working, rather than just making assumptions. Talk with the fishermen directly.

Bob Anderson: Need boat routes to avoid conflict with the fishing boats.

Gerald Pond: Before doing anything final--the people should be able to read the final EIS and make sure it is the way they want it because they have to live in Yakutat.

Bob Anderson: Very concerned about the fact that there was not much concern, if any, under Sale 39. The oil companies that were land based did an excellent job, but at a level. Had problems with people off the rigs. Confrontations were very low keyed for Sale 39.

There is a tremendous difference resource-wise between 55 and 39. Impacts will be much greater because of the resources.

Larry Powell: Not much planning for conflicts with the oil companies in 39. Factor of planning totally overlooked, but can be addressed in 55. They have a better idea of constructive alternatives. Will work as hard this time to keep working with the oil companies, but if our studies and EIS take that into consideration, it will greatly benefit them.

Bob Anderson: Should consider impacts on the resource, and on the individuals exploiting that resource. Should strike the area nearshore.

Caroline Powell: These impacts that people have to plan for are not locally generated, but there is a lot of planning that Yakutat has to do because of the government.

There will be a congested harbor with a bottomfishing plant, possibly two cold storages, LNG plant, and with extended oil, you will have an extended service base. Whatever happens in the harbor has a ripple affect that must be responded to in port studies, housing, etc. Some of the work could be done in some of the studies.

Previously Yakutat applied for an oil spill contingency plan to be funded. Wanted to know what plan was in effect. Coast Guard stated they would check on it and get the plan to them. It came back that there is no plan on the federal level or the state that they can go out and clean up an oil spill. "Why isn't there a good plan?"

Bob Anderson: Yakutat for one, and many of the other communities, are trying to maintain the resource balance that exists with a plan to go forward. Because we are a discrete area, we are probably in better shape than a majority of others. Because of good management, Yakutat has come back with their fin fish. Presently being hemmed in without Sale 55. The very fact that the fish go through the mouth of the bay, they will conflict with the boats. Suggest curtailment of the operation during the only good months of the year, which is during the fish runs, primarily during July, August and September. Without that curtailment, the resources will be destroyed. To be non-detrimental to a resource, the time would be May through September.

Larry Powell: Need to get money from the state or federal government in time to do some good. Request OCS recommendations to the state agencies stating that OCS sees a need that Yakutat is expressing. OCS should recommend strongly that the state expedite making funds available so they can control studies to help facilitate the EIS.

Not totally against the process. Realize the need and that it has some advantage to the community, but insist they be in control to better the community. Whatever is to be done, let's do it right and make sure that what is done is well thought out, well planned, and that we know where we are, having the proper data and planning to make competent decisions. Have the resource data. Feels we are still at the basic position. Yakutat still wants to be a partner and thinks it can be done, but should be done right. Things must be done first to allow that to happen.

Larry Powell: CZM will not address all their concerns. Over and above that their concerns have to be addressed. The CZM plan should be completed prior to the final conditions of a sale. Would also like to expedite the CZM plans. Any assistance OCS can provide to get Community and Regional Affairs to expedite application would be helpful. Yakutat could hopefully have their studies completed.

ARCO has their investment in the community. They are not going to sit there forever waiting for something to happen. If they are going to have the sale, the community will be better off--given reasonable time constraints--to do it now rather than wait four or five years and then do it, because the community and local government is keyed up through their work and planning. Wait and the interest, the pressures from other areas will take precedence, and the office will start working on other things. Yakutat needs to push with this activity and continue with the studies, but if they are going to have the sale, get the sale over with after the studies. Stop it from being held over their heads.

Gerald Pond: Not against the sale--just that many are making their living in that area and the oil is coming into the area, and they should have consideration and respect enough for the people making their living there to listen to them, and in the final analysis, to allow for routes, etc., to accommodate their needs. After the oil is gone, the people

will still be there living off the fishing. Oil is a temporary matter, the next generation will require the fishing.

Bob Anderson: Most of the people came here for the lifestyle--not the economics. It is the lifestyle that will be ruined--not just the resources--which is why the majority came here.

Caroline Powell: Pacific Gas and Light has leased about 400 acres on the point from the local native corporation out of which they were to choose 200 acres. The Commission just received the Planning and Zoning plat where they have made their selection and have their 200 acres directly across the bay (south shore of Monti Bay). Also, the labor force to build the plant would be substantial.

Larry Powell: Would like to make two points as a matter of record:

1. A specific document that probably should be updated, but it probably still represents the feelings of the majority of the people and should be very closely used as the Bible in studies that are conducted with reference to Yakutat as to what the community needs is the Socioeconomic Survey of the Yakutat area that was conducted in 1975. This should be referenced as a mandatory document for any of the authors.

2. Since Sale 39, Department of the Interior has known about the other potentials from all the seismic work in the gulf, and looking at Sale 55 with the areas defined in it, those domes and structures in that area will probably be more promising. The oil people admit it. Over the years since 39, the planning and studies have gone down to zero. What will be done with the oil once it's found? Should not have stopped in 1976 with preparation to determine what will be done with the oil. What's the land capability in Yakutat? Attitudes of the people? What is it going to do? Where would a tank farm be? The projections given the potential use there have basically come to a screeching halt. Still have not addressed these problems prior to 55. If the community does not want an LNG plant, what technology do we have today for transferring that oil to a tankering system without bringing it onshore? Icy Bay as an alternative is as bad as Yakutat. The preparation should not be stopped.

Bob Anderson: There will be no compensation to the people for a ruined lifestyle.

Caroline Powell: Within the municipality, the extent of disruption to the lifestyle can be controlled. Outside the municipality there is no control.

Bob Anderson: Land resources are limited. Areas will only support so many animals and take so much pressure. Permanently placed people could have a significant impact upon the wildlife.

Caroline Powell: Would hate to see development of Icy Bay take away some of the focus of impact studies on Yakutat. Because of the way Icy Bay silts up, and the ice, you would have to be constantly dredging to continue use. If factors exist, if Icy Bay will share impacts when it cannot be used in fact, it could dilute the focus of the studies.

Larry Powell: First thoughts were if we had our druthers we would prefer not to have it. This is not an option because the government went ahead with Sale 39. The oil companies were present. Yakutat modified their position to accommodate and be a partner to the development. What we are continually doing is leading ourselves down the road of trying to control the thing, minimizing the change in lifestyle, minimizing the impacts on the community, minimizing the number of people, and the only way that can happen, the only way to be successful, is to have total cooperation. They have had cooperation from the state, but must have it from the federal government as well so that when a construction process starts and it takes a greatly increased labor force, the community can state where and what type of units will house those people, with confinement of the people to those areas. These things they must do to protect and control it. Controls must be governmentally mandatory controls that tell the companies in the process and make it very clear as to what will be done. They are going to protect the lifestyle and will do it at all costs. If they have to go to litigation, they will ask the state to join them to develop standards. These references must be made in the documents as they are being prepared. Yakutat needs these types of governmental safeguards to protect their lifestyle, but allow for development.

Bob Anderson: Commercial transportation will be a problem. Three platforms over a period of three to four years, will have problems. Started having problems within a year after the start of Sale 39; specifically, the conduct of the oil people on commercial flights. Controlled by severe isolation. It was a conduct problem that grew and increased in intensity.

There are cumulative impacts that over a period of time take effect.

The impact of permanent types coming into the community impact on the resources.

Caroline Powell: Speaking as Planning and Zoning Commission Chairperson, we need some help. The Comprehensive Development Plan, the Capital Improvement Plan, and plans based on Sale 39 are totally outdated. Figures in Sale 39 and Sale 55 appear to be vastly different. Possibly just an update is required, but at least a review with some technical assistance is needed.

Larry Powell: An important factor is the separation of communities in Sale 39 vs. Yakutat alone in Sale 55 taking the impacts.

Caroline Powell: Give us time and assistance because we are the ones who are paying for something that is not caused by us. Want the planning done well in advance. If the figures they are working with now are of no use to them, would like to see a recommendation that there needs to be some updating with assistance prior to the sale.

Larry Powell: The transient populations in Valdez do not know what it's all about. They only know what they have been associated with. Yakutat is going to have to be absolute bastards to maintain what they have. Need help to do that. Yakutat's protection is foremost. Say no and be definite.

Oil company employees cannot purchase property in Yakutat. The oil companies must enforce this through a threatened job loss. The oil companies must listen to local demands. Push in that direction. Request stringent standards and safeguards.

Bob Anderson: I do not believe it can be controlled to the point to not totally disrupt or change the lifestyle. There is no possible way to save the land resources that we deem critical and necessary to our lifestyle. If a resource is in trouble, Fish and Game is mandated to close down an area.

Gerald Pond: The only real resource left that is really replenishable is the fin fish. Sport fishing, totalling 40,000 pounds, were shipped out with only one construction company, plus all the other sport fishermen.

Larry Powell: Currently there is an impact on the commercial and subsistence fishing by sport fishermen. Bag limits were changed on sport fishing, but are up again.

Bob Anderson: Interception between offshore and spawning will wreck the resource. Must maintain the escapement. Fish and wildlife resources will only support so much activity.

Larry Powell: The No. 1 industry is commercial fishing. We are not basically at odds with potential oil impacts, but also much aware of the potential of the timber industry which could have a very severe impact upon the fish populations because the spawning areas may be destroyed through cutting the timber resource. Timber is as great a threat as oil to protect the resource that supports 90 - 95% of the population.

I cannot condone an onshore tank farm, but do not have rational alternatives. I fear the probability more than anything in the process because of what has happened in Valdez. Valdez has had over 500 separate spills in the harbor from the tankering operations. Extremely high incident of small spills that accumulate.

Gerald Pond: Small spills would be more of an impact on Yakutat as far as the local economy goes because of the fishing in the bay. Fifteen or so make their living in the bay by setting their nets.

Ron Ball: There would be leakage and spillage just from the operations of the vessels themselves.

Gerald Pond: We cannot cancel the sale, but should delay until the studies are completed and submission of rules and regulations.

Larry Powell: Strides have been made with a positive approach--working toward a positive goal, recommending alternatives, innovation in working toward a common goal--as opposed to saying no. From that position we have gained total state support. I do not believe that Yakutat is going to gain from saying no. Will gain more by pushing further to say, "We have done a lot of work to help control the mitigation of impacts and we will not stop at this point." Want more assistance and responsibility taken by the state and federal governments. Can at least push further to say no on specifics after they have their studies completed.

Ron Ball: As the national oil crunch gets worse and we wind up back at 39, they will just come in and do it. The approach is to prepare, mitigate, and lessen the impacts.

Larry Powell: If there is no push by the feds--no push for funds for studies--the community will fall to a low ebb. The community will get down and not be prepared for it. As the community changes in population structure and governmental structure, you could have a whole different approach to the project from today. Psychologically, they are geared up for it today and physically able to get the money to get the machinery moving. Can develop safeguards.

Gerald Pond: If the sale is cancelled now, will have a much more severe impact later.

Larry Powell: We have developed contacts and rapport with the oil companies--good working relationships with the companies--and that will help. A different top management in the oil companies in the future will be difficult to deal with. It is not physically possible to get everything done prior to the sale--it is possible to delay the sale. Yakutat is basically prepared to develop the programs. We just need access to the funds.

Gerald Pond: Main concern is that possibly 80 - 90% and even 100% of some businesses are related to fish. No fish means bankruptcy. What's going to be best for the fishermen? Can we still have our resource and our way of life--the way in which we have always done it--in conjunction with development if possible?

Larry Powell: Have always felt as a result of offshore activity there might be a plan out on oil spill, but ironically today, with the tankers, the agency having control (the Coast Guard) does not even have a working draft despite the fact that Yakutat was told one existed. What will be done in response to an oil spill? Two hundred thousand tons of crude oil per day is being transported past Yakutat. The Mayor cannot even get a copy nor see the draft that is being worked on.

Larry Powell: Yakutat has something worth protecting--commercial fishing is strong and healthy. The environment is worth saving. The local people want to preserve it for their future generations.

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